CHILD-LIFE ARITHMETICS

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GRADE FIVE

By

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INTRODUCTION

An institution is said to be nothing more than the elongated shadow of a man. Modern arithmetic in America is the lengthened shadow of Warren Colburn. It was he who in 1821 broke the monopolistic fetters of adult standards in this subject and gave to us our first real text for children. Today the Colburn-Pestalozzi tradition lives on in undiminished force. In our thinking about methods it has lifted the psychological processes of the child to a place of equal importance with the mathematical processes of the subject.

In their work of several years on this series of texts, authors and publishers alike have placed the demands of childhood in the front rank of preferred claims. This will explain the upward gradation of certain major topics; the more gradual development of complex computational processes; the use of relatively small units with their pleasant variety, page unity, and short attention span; the meticulous elimination of unnecessary vocabulary and other linguistic difficulties; the systematic introduction of arithmetical processes in social situations familiar to children; the painstaking attempt to make the necessary technical terms meaningful on their first occurrence; the carefully phrased explanations of new arithmetical processes; the conspicuous presentation of generalizations following their development and preceding their application; the wide variety of projects, whose interest appeal is enhanced by hundreds of beautiful illustrations in three and four colors; the adjustment to individual differences by a scientifically organized program of diagnostic testing with remedial exercises keyed thereto; and the definite provision of enrichment for the ablest pupils.

These and other features of the books are the direct result of a sustained endeavor to smooth the way of the child to competence by a more natural and scientific approach. And such an endeavor reflects the basic aspiration of all instructional methodology.

THE AUTHORS

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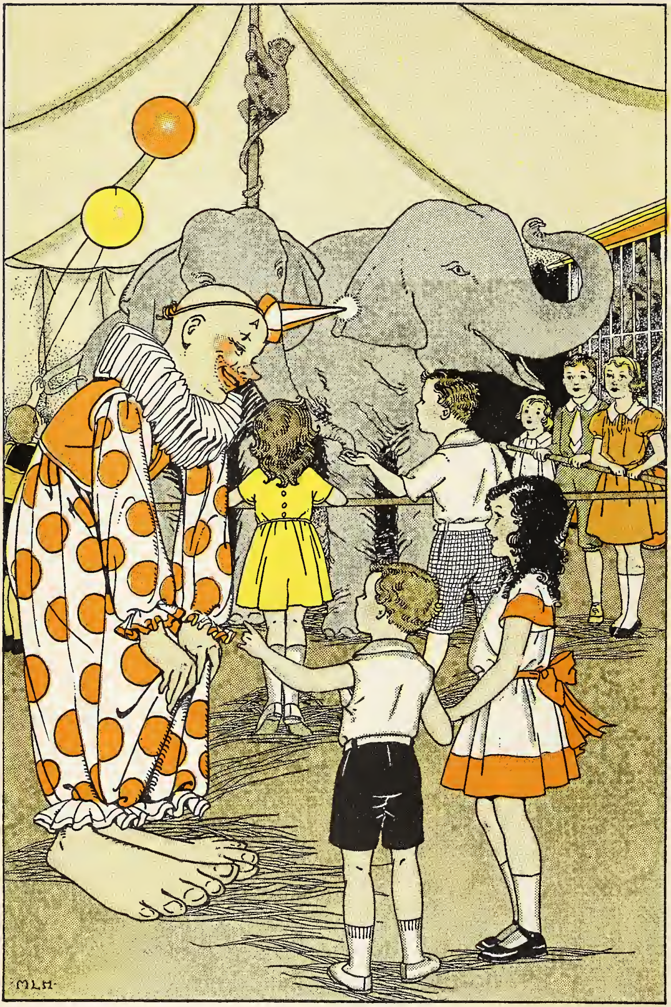
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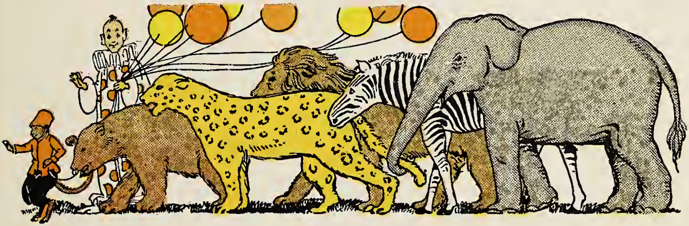
CHAPTER I

MORE ABOUT ADDITION, SUBTRACTION, AND MULTIPLICATION

Adding Numbers



THE CIRCUS

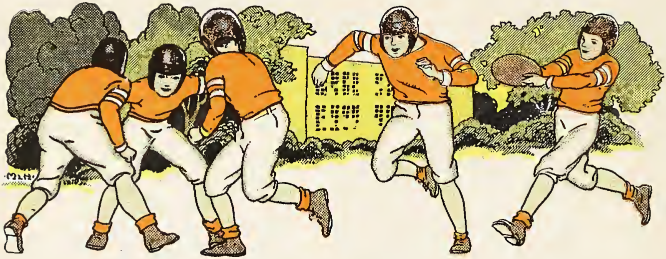
The children learned these things about the circus.

1. Among the trained animals in the circus were 39 elephants, 72 seals, 56 ponies, 34 dogs, and 42 monkeys. Besides these there were 402 untrained animals. How many animals were in the circus?

2. To Jumbo, one of the large elephants, the men fed 185 pounds of hay, 19 pounds of bread, 23 pounds of lettuce, and 58 pounds of cornstalks. How many pounds of food did the men give Jumbo?

3. When the keeper fed Hippo, the hippopotamus, he gave him 120 pounds of hay, 13 pounds of bread, 8 pounds of cabbage, 6 pounds of lettuce, and 52 pounds of green corn. How many pounds of food did the keeper give Hippo?

4. Make three problems about a play circus.



THE JACKSON TIGERS

In the lower grades you have been adding, subtracting, multiplying, and dividing numbers.

Do you remember how to add numbers?

1. In last Saturday's game the Jackson Tigers gained 105 yards in the first quarter, 28 yards in the second quarter, 9 yards in the third quarter, and 48 yards in the last quarter. How many yards did they gain during the game? $105+28+9+48=?$

$$\boxed{\begin{array}{r} 105 \\ 28 \\ 9 \\ \underline{48} \\ 190 \end{array}}$$

(a) Can you write these numbers correctly in columns?

(b) Do you add down?

(c) Do you know the 100 addition facts, like $5+8=?$ $9+6=?$ $7+5=?$

(d) After you add 5 and 8, can you add by endings 13 and 9, then 22 and 8, and get 30?

(e) Do you write 0 in the sum? Where?

(f) What do you do with the 3 in 30?

(g) Do you check your work by adding up or down?

See if you can say the sums in these examples in 3 minutes or less. The examples below the line are harder to remember.

1	1	2	2	1	3	5	1	8	7
1	0	2	1	2	1	5	3	1	1
2	1	9	0	6	4	1	4	8	3
0	6	0	0	1	0	8	1	0	2
3	7	1	1	5	0	0	5	0	2
3	7	7	5	2	3	4	0	6	9
1	9	0	6	3	5	0	6	5	7
4	1	1	6	0	1	5	0	4	0
0	2	1	2	0	4	4	0	7	0
2	4	9	3	8	2	4	7	2	9

4	2	9	4	2	8	8	8	5	6
5	8	2	3	7	3	2	8	3	4
3	6	3	7	3	3	4	3	6	8
5	2	4	3	7	9	8	8	3	4
6	3	4	9	2	5	9	2	7	6
7	6	6	9	6	7	3	5	4	5
9	9	5	7	8	7	8	4	4	9
4	5	6	5	6	6	9	9	7	8
6	5	8	7	5	9	6	9	7	8
8	8	7	8	9	6	9	7	9	5

1. If there were addition facts that you could not give quickly in the test, copy them on paper. Under each of those facts write the sum.

2. Cover the 100 addition facts on page 3 with a piece of paper. Move the paper down slowly, and say the sums as fast as you see the examples.

3. Do exercise 2 again, but move your paper down faster than before. Keep trying until you can say the sums as fast as you see the examples.

4. Pupils sometimes make mistakes on the addition examples below. Say the sums several times.

9	6	8	4	6	9	7	3
8	7	6	8	9	5	5	7

4	9	7	3	9	3	5	9
6	4	6	5	6	6	7	3

5. The sums below are among the hardest to remember. Read each example two ways, and say the sum: 4 and 9 are 13, 9 and 4 are 13. Read:

4 and 9	7 and 8	9 and 7	5 and 8	8 and 9
8 and 7	6 and 8	5 and 9	9 and 6	7 and 9

6. Watch zero in addition:

1	0	4	9	0	0	6	0
0	1	0	0	0	8	0	3

6	1	6	8	6	1	7	5
1	0	1	2	0	7	0	9
0	9	7	0	4	8	8	0

MARKING THE FOOTBALL FIELD

You know that 8 and 3 are 11, 18 and 3 are 21, and so on up to 88 and 3 are 91. This is called **adding by endings.**

Adding 3 to a number that ends in 8 gives a number that ends in 1.

1. The Jackson Tigers needed lime to mark their playing field. To buy it Sam gave 8¢; John, 3¢; Ed, 7¢; and George, 3¢. How much money did the four boys give for lime? $8+3+7+3=?$

$$\begin{array}{r} 8 \\ 3 \\ 7 \\ \underline{3} \\ \mathbf{21} \end{array}$$

Sam wrote the numbers in a column and said: 11, 18, 21. He added in this way:

(a) Think 8 and 3; **say 11.**

(b) Think 11 and 7; **say 18.**

(c) Think 18 and 3; **say 21.**

The sum is 21.

Sam added by endings when he said $11+7=18$ and $18+3=21$.

2. Add 6 to each number in (a) and (b) below.

(a) 3 13 23 (b) 5 15 25 35

3. Add 7 to each number.

(a) 8 18 28 38 (b) 6 16 26 36

4. Write each row of numbers in a column and add in the way Sam did.

(a) 4, 7, 6, 8, 6, 9 (b) 4, 9, 7, 5, 9, 8

(c) 6, 8, 4, 6, 8, 9 (d) 9, 5, 3, 8, 9, 9

In practice work, do not copy the numbers. Place a paper under the examples, and write the sums on your paper as you add.

1. Add each of these examples. Do not copy.

385	243	645	716	357	429
319	546	115	174	249	288

2. Tippy Toe was the funniest clown at the circus. He gave away 232 balloons on the opening day, 524 the second day, 406 the third day, 28 the fourth day, and 416 the last day. How many balloons did he give away during the 5 days? $232+524+406+28+416=?$

$$\begin{array}{r} 232 \\ 524 \\ 406 \\ 28 \\ \underline{416} \\ 1606 \end{array}$$

Add down. Begin with the right-hand column. Think: 6, 12, 20, 26. Write 6, and remember 2. In the next column begin with the 2 remembered. Think: 5, 7, 9, 10. Write 0 and remember 1. In the next column begin with the 1 remembered. Think: 3, 8, 12, 16. Write 16.

The sum is 1606.

To prove your sum is correct, **check** your addition. Do this by adding from the bottom up.

Write these numbers in columns and add down. Then check your addition by adding up.

3. (a) 523, 83, 565, 81, 4
(b) 72, 79, 26, 70, 10
(c) 103, 81, 5, 100, 3
(d) 316, 790, 58, 296
(e) 144, 9, 85, 80, 88
(f) 901, 20, 4, 76, 102

WATCH THE GROCERY CLERK

Below are some numbers the grocery clerk added. In each example write the numbers in a column. Then add and check.

1. $1.98, $.46, $.34, $.65
2. $.05, $.90, $1.94, $.66
3. $.09, $.85, $1.25, $2.15
4. $.33, $.72, $1.16, $.90
5. $.52, $1.25, $.06, $.28

Place a paper under row 6. Write the sums without copying the examples. Check each sum. Then fold the top of your paper back and write the sums for row 7. Check each sum. Fold your paper again and write the sums for row 8. Check.

6.	44	46	238	809	39	64
	25	39	12	219	108	4
	17	76	505	154	500	619

7.	$ .82	$5.03	$3.98	$7.60	$9.06	$5.00
	.18	3.17	.78	.45	1.91	.95
	3.84	.49	8.70	9.00	.38	2.08

8.	950	378	34	494	783	954
	65	21	732	307	928	359
	6	75	91	838	344	376
	26	108	47	575	107	428

FINDING OUR WEAK SPOTS

This test will help you to find your weak spots in addition. Number each exercise on your paper the same as the exercise in the test. Write the examples and add. Your teacher will sometimes have you do part of an example "out loud" to find what your trouble is.

1. Zeros in Addition

50	40	10	61	20	34	87
67	70	10	70	80	90	50

2. Sum of Column More than 9

85	79	96	25	45	63	89
26	21	86	65	45	59	36

3. Longer Columns

5	28	16
9	45	63
6	82	40
6	17	38
8	79	75

$25+6+147+20=?$

$30+29+5+168=?$

$94+36+488+5=?$

4. Adding United States Money

\$4.20	\$24.62
5.08	8.58
6.12	40.13
7.35	.89

\$4. + \$10.50 + 25¢ = ?

\$.35 + 98¢ + \$79.99 = ?

\$17.95 + \$8. + 98¢ = ?

\$105.26 + \$8.88 + 75¢ = ?

If you made mistakes in any of these exercises, do the exercise of the same number on the next page. Then try that part of the test again.

CURING OUR WEAK SPOTS

1. Zeros in Addition

Remember: Zero means **nothing.** If 0 is added to a number, the sum is that same number. If a number is added to 0, the number is added to nothing. The sum is the same number. When you add 0, **think.**

40	50	14	51	80	68	95	20	33
77	80	10	60	20	70	30	52	80

2. Sum of Column More than 9

Write the sums on paper. In the first example the sum of units' column is 14. Write the 4 on your paper. Add the 1 in tens' column. Add: 9, 11. Write 11 at the left of 4 on your paper. The sum is 114. Find all these sums in the same way.

89	75	71	86	52	65	44	23	86
25	26	29	96	62	55	64	69	39

3. Longer Columns

In each example write the numbers in a column on your paper. Put units under units, tens under tens, and hundreds under hundreds. Then add.

(a) 5, 9, 6, 6, 8 (b) 48, 25, 12, 87, 79
(c) 46, 13, 60, 78, 35 (d) 20, 147, 25, 6, 18
(e) 417, 42, 459, 8, 83, 540, 30

4. Adding United States Money

Copy in columns and add. Keep the decimal points in columns as you write the numbers.

(a) \$6.12 \$5.08 \$4.20 \$7.35 \$4. 25¢ \$.35
(b) \$105.26 75¢ \$8.88 \$99.98 \$8. \$100. \$.60

WINNERS' PAGE
For the pupils who made no mistakes in the test on page 8.

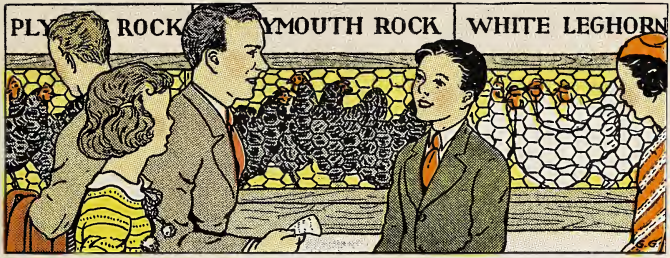
ADDITION HELPS US

1. Mary is making a dress in sewing class. The cloth cost $1.56, the thread 10¢, and the buttons 48¢. How much did Mary pay for all of these things?

2. Five children in our class have offered to sell school papers. Frances wants to take 16, Esther 19, Henry 27, and Dot 11. Billy says he can sell 23. How many papers do they want to sell?

3. Our teacher wants us to stamp the name of our school in each book that came during Book Week. We have 33 new books that the Parents Club gave us, 85 from the library money, and 31 that pupils gave us. How many new books do we have to stamp?

4. Billy has just been promoted to our class. He needs: paints, 25 cents; colored pencils, 10 cents; notebook, 15 cents; arithmetic work book, 20 cents; and gym shoes, $1.29. How much will Billy need to pay for these things?



1. At the poultry show Jim had 24 Plymouth Rock hens and 13 Leghorn hens. How many more Plymouth Rock hens than Leghorn hens did Jim show?

$$\begin{array}{r} 24 \\ \underline{13} \\ 11 \end{array}$$

To find the difference between 24 and 13, subtract 13 from 24.

Write the number to be subtracted under the other number.

Think: 3 from 4 is 1. Write 1 under 3.

Think: 1 from 2 is 1. Write 1 below.

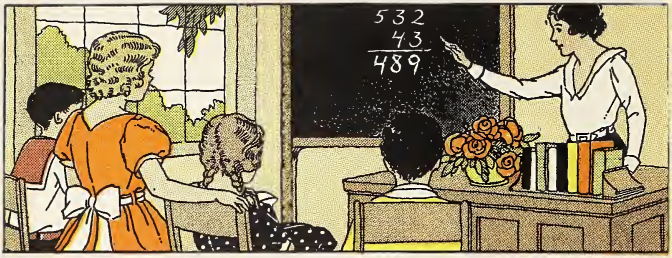
The difference is 11.

Jim showed 11 more Plymouth Rock hens.

2. Carol had 48 pieces to sew in her quilt. She sewed 26. How many pieces are left to sew? **To find how many are left**, subtract 26 from 48.

3. Grace took 9 books from the shelf. There were 13 pupils in the class. How many more books did Grace need to give each pupil one? **To find how many more were needed**, subtract 9 from 13.

4. John wants to buy a bicycle marked down from $22.75 to $12.75. He has $5.45. How much more money does he need to buy the bicycle?



DO YOU REMEMBER HOW TO SUBTRACT?

1. The number of pupils who attend the Dixon school is 532. Today 43 pupils are absent. How many are present? $532 - 43 = ?$

(a) Tell how we should write the numbers to be subtracted.

(b) Where should we begin to subtract?

(c) Begin in the above example: 3 from $12 = ?$

(d) Where do you write the 9?

(e) Why was 10 added to 2?

(f) After 10 was added to 2, what must be added to 4 below?

(g) Now subtract in the next column: 5 from $13 = ?$

(h) Where do you write the 8?

(i) What is the last figure you write in the remainder?

(j) There are three subtraction facts in this problem: $12 - 3$, $13 - 5$, and $5 - 1$. How many of the 100 subtraction facts do you know?

Try to say all the remainders in 3 minutes. Then practice on any that you cannot say quickly.

The examples below the line are harder to remember.

10	9	2	0	3	4	4	3	8	4
5	1	1	0	2	1	3	1	1	2
9	9	7	11	2	4	7	5	8	5
8	9	6	5	0	0	1	1	0	2
8	6	14	6	8	5	7	11	7	12
7	3	7	5	4	0	0	6	7	4
12	5	10	10	6	8	3	6	3	9
6	4	2	1	2	6	0	0	3	0
5	2	6	8	1	1	10	4	5	6
5	2	1	8	0	1	9	4	3	6

6	9	7	9	7	9	11	8	16	9
4	6	2	2	3	5	3	3	8	7
8	10	9	11	7	7	10	12	12	11
5	8	3	8	5	4	3	8	9	2
13	11	10	9	10	18	10	8	12	17
6	4	7	4	6	9	4	2	3	8
13	14	11	17	11	13	13	14	12	14
4	5	7	9	9	9	7	6	5	9
12	14	15	15	15	15	16	13	16	13
7	8	6	8	7	9	7	8	9	5

1. Copy on paper the subtraction facts that you could not give quickly in the test. Under each fact write the remainder.

2. Cover the 100 subtraction facts on page 13 with a piece of paper. Move the paper down and say the answers as fast as you see the examples.

3. Pupils sometimes make mistakes on the examples below. Say the remainders for each of these examples several times.

(a)	11	9	8	18	14	12	9	14
	3	5	3	9	6	3	6	8
(b)	13	11	14	13	11	13	15	16
	4	7	5	9	8	7	6	7
(c)	13	14	15	17	15	16	13	17
	5	9	7	8	8	9	8	9

4. You need to know quickly what number must be subtracted to leave a given number. Read the examples below and say the numbers that should be subtracted to leave the remainders.

12	9	15	13	12	7	11	8	1
–	–	–	–	–	–	–	–	–
7	3	6	7	3	2	2	0	0
11	12	9	12	11	9	11	12	7
–	–	–	–	–	–	–	–	–
6	5	2	4	5	9	7	6	7

Zeros make trouble if you don't watch out.

COUNTING THE CARS

1. Sunday afternoon Jack and Paul counted 360 cars passing their house on Route 16. Monday afternoon they counted 187. How many more cars did they count Sunday than Monday? $360 - 187 = ?$

When the figure in the subtrahend is larger than the figure above it in the minuend, add 10 to the minuend figure and add 1 to the next left-hand figure in subtrahend. Then subtract.

Adding 10 in units' place is the same as adding 1 in tens' place.

Adding 10 in tens' place is the same as adding 1 in hundreds' place.

360 Minuend
187 Subtrahend
173 Difference

Think: 7 from 10 is 3.
Write 3.
9 from 16, 7. Write 7.
2 from 3, 1. Write 1.
The remainder or difference is 173.

The boys counted 173 cars more on Sunday.

Subtract to find the difference between two numbers.

In the problem about counting the cars, you subtracted 187 from 360. The remainder or difference is 173.

360	**Minuend**
187	**Subtrahend**
173	**Remainder**
360	**Check**

Subtract, and say each step. Without writing, add the subtrahend and the remainder. Is the sum of these two numbers the same as the minuend?

This checks the subtraction.

Check subtraction by adding the subtrahend and the remainder. Their sum equals the minuend.

In each example below name the minuend and the subtrahend. Then subtract and write the remainders on a folded paper. Check.

1.	78	86	93	45	55	61
	40	60	53	44	9	37
2.	469	687	410	531	383	914
	339	426	23	52	94	15
3.	715	602	809	708	825	798
	89	15	492	559	720	594
4.	7101	3212	3221	9085	7122	4002
	710	224	754	577	5543	1366

Subtract and check:

5. $19781 - 4698 =$ $46110 - 26481 =$

Subtract each of these numbers from 1000:

6.	487	992	108	24	17	600
7.	156	385	290	83	79	749

AT THE BANK

1. Arnold had \$14.20 in his savings account at the bank. He drew out \$4.75 to buy a pair of skates. How much money did he have left in the bank? \$14.20 − \$4.75 = ?

\$14.20
4.75
\$ 9.45

Write the numbers so that the decimal points are in a line.
Think 5 from 10 leaves 5. Write 5.
8 from 12, 4. Write 4.
Write the decimal point.
5 from 14, 9. Write 9.
Write the dollar sign.

Arnold had \$9.45 left in the bank.

Subtract to find the remainder when you take one number from another number.

Place a folded paper under the examples. Subtract and write the remainders on the folded sheet. Then check each answer under the remainder.

2.	\$97.81 74.67	\$55.31 47.45	\$10.00 9.79	\$46.11 35.36
3.	\$81.20 1.84	\$134.55 66.93	\$12.51 9.09	\$8.00 2.90
4.	\$141.30 83.00	\$80.37 45.29	\$14.34 9.40	\$57.80 12.86

5. Take \$.73 from \$9.00. Take \$4.87 from \$20.00.

6. Take \$2.56 from \$5.00. Take \$17.68 from \$20.00.

BUYING GRACE'S NEW SCHOOL OUTFIT

Grace's mother went to a sale at Hale's Big Store to buy Grace some new clothes for school. These are problems about things she bought.

1. She bought a sweater marked \$2.75 for \$1.98. How much was it marked down?

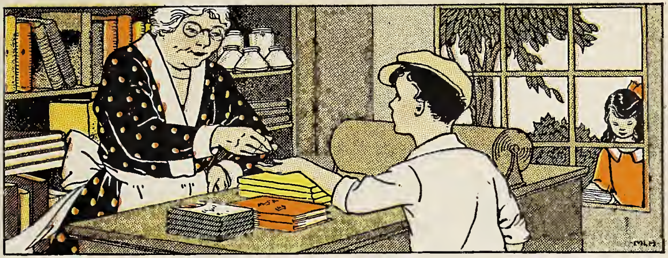
2. Grace's mother bought Grace a pair of shoes for \$3.79. They had been selling at \$4.95. How much lower was the price at the sale?

3. Grace wanted a new raincoat, and her mother found just the right kind for \$2.95. It was a good bargain, for it had been selling at \$4.75. How much lower was the price at the sale?

4. Dresses that had been marked \$6.95 were reduced to sell for \$5.49. How much were these dresses marked down for the sale?

5. A red leather belt marked 65¢ was priced at 27¢ yesterday. Was it marked down as much as 35¢?

6. Make a problem about other things that Grace's mother might have bought at the sale. Then solve the problem and check your answer.



GETTING CHANGE AT THE SCHOOL SUPPLY STORE

1. Jerry bought a box of crayons for 16¢. He handed Mrs. Harris 25¢. How much change should Jerry receive? In what coins?

Mrs. Harris made change for Jerry. She said, "16 and 4 are 20, and 5 are 25."
She handed Jerry 4 pennies and a nickel.

2. Jim came in with a one dollar bill. He bought a geography book for 65¢. How much change should Mrs. Harris give Jim? In what two coins?

Pretend you are Mrs. Harris and make change the same way in the examples below:

3. Dick had 50¢. He bought erasers for 18¢.

4. Angela had $1.50 to pay for her gym shoes. They cost $1.29.

5. Jack had a five-dollar bill to pay for his arithmetic book. The book cost 72¢.

Subtract to find out how much must be added to one number to make another number.

Suppose that you are buying things that cost what is shown in the second column, and that you pay for them with the money shown in the third column. Find how much change you should receive in each example, and check your answer. Number your paper from 1 to 10 and write your answers.

Example	Cost of Things	Money Handed to the Clerk
1.	$1.33	$ 1.50
2.	2.67	3.00
3.	4.05	5.00
4.	2.26	2.50
5.	3.89	5.00
6.	.73	5.00
7.	2.41	10.00
8.	4.38	5.00
9.	1.74	2.00
10.	.28	1.00

11. Lucille bought a new hat for $2.98. Mary bought one for $1.75. What was the difference between the cost of these hats?

12. Albert bought a pair of gloves for 69¢. You decide what piece of money Albert handed to the clerk and ask someone in the class how much change Albert should receive.

13. Mary bought six handkerchiefs for $1.00 and a blue scarf for 39¢. She handed the clerk two one-dollar bills. How much change should she receive?

Subtraction is finding the difference between two numbers.

IN THE LIBRARY

1. Alice has read 109 pages in her book. It has 186 pages. How many pages has she left to read?

2. Jane helps in the library. Tuesday she carried books to 5 classrooms as follows: 25, 27, 18, 12, 25. How many books did she carry out that day?

3. In our library reading this month Frank read 1416 pages in different books and Doris read only 776 pages. How many more pages did Frank read this month than Doris?

4. In September, 296 children in our school had taken out library cards. By the end of October 400 children had cards. How many more children had library cards at the end of October than in September?

5. We needed $365.00 for books and magazines. We earned $246.72 from our operetta. How much more money do we need for the books and magazines?

6. Last year we spent $385.00 for books and magazines, the year before $265.00, and this year we would like to spend $675.00. If we spend this amount, how much will we have spent for books in the three years?

FINDING OUR WEAK SPOTS

This test will help you to find your weak spots in subtraction. Number each exercise on your paper the same as the exercise in the test. Write the examples on your paper and subtract. Your teacher will sometimes have you do part of an example "out loud" to find what the trouble is.

1. Finding and Writing the Remainder

468	972	445	676	874	559	898
143	732	432	75	652	536	542

2. Some Figures in Minuend Smaller than Those in Subtrahend

413	923	542	757	515	293	543
318	837	234	689	466	284	285

3. Writing Numbers and Subtracting

$275-8=?$ $218-18=?$ $188-99=?$
$115-77=?$ $325-144=?$ $162-85=?$

4. Zeros in Subtraction

247	382	195	423	800	370	101
205	350	109	403	709	300	10

5. Writing and Subtracting United States Money

$\$10.25-\$4.35=?$ $\$1.00-29¢=?$ $\$5.00-\$1.85=?$
$\$70.75-\$1.05=?$ $\$34.-\$23.45=?$ $\$5.50-85¢=?$

If you made mistakes in any of these exercises, do the exercise of the same number on the next page. Then try that part of the test again.

CURING OUR WEAK SPOTS

1. Finding and Writing the Difference

328	456	842	655	698	225	897
124	255	321	455	335	114	655

2. Some Figures in Minuend Smaller than Those in Subtrahend

Remember: If the figure above is smaller than the figure below, add 10 to the figure above. Then add 1 to next figure to the left below.

Copy and subtract.

942	548	254	751	322	421	742
899	178	245	298	165	365	555

3. Writing Numbers and Subtracting

Put units under units and tens under tens.

$321-164=?$	$275-7=?$	$142-14=?$
$351-68=?$	$425-165=?$	$124-75=?$

4. Zeros in Subtraction

170	490	200	604	701	350	301
7	99	120	396	501	200	202
101	823	800	324	195	247	370
10	503	709	304	109	205	300

5. Writing and Subtracting United States Money

$5.50 – 85¢ = ?	$5.00 – $1.85 = ?	$70.75 – $1.05 = ?
$60.50 – $24.85 = ?	$3.45 – 99¢ = ?	$5. – $.35 = ?
$100. – $2.05 = ?	$1.00 – 29¢ = ?	$10.25 – $4.35 = ?
$34. – $23.45 = ?	$25.75 – $8. = ?	$1. – 67¢ = ?

WINNERS' PAGE
For the pupils who made no mistakes on page 22.

1. Last summer the fifth grade children of Addison school sold vegetables from their garden. At different times they received $4.35, $6.19, $4.38, $7.67, and $8.79. How much money did they receive for the vegetables?

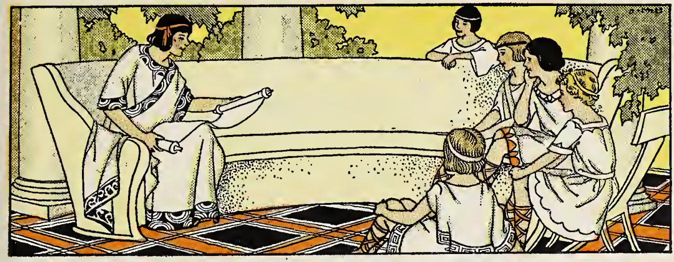
2. Our library teacher examined 1178 books in the school library and found that 118 needed to be repaired. How many books were in good condition?

3. Bob has saved $3.60 to buy a copy of *Robin Hood* and a dictionary. The books he wants will cost $4.25. How much more money must he save?

4. Dorothy ordered *The American Girl* for one year at $1.50. She would rather have *St. Nicholas*, but it cost $4.00 and she did not have that much money. How much more money would she have needed if she had ordered *St. Nicholas?*

5. For the Red Cross, the kindergarten children brought $1.23; the first grade brought $2.09; the second grade, $5.44; the third grade, $2.68; fourth grade, $4.96; fifth grade, $2.44; and sixth grade, $4.16. How much money did these grades bring for the Red Cross?

6. Tom has saved $1.65 selling copies of *The Saturday Evening Post.* He wants to buy a catcher's glove which sells for 35¢, a baseball bat at 65¢, and one baseball at 50¢, so that he can play with the home team next Saturday. Has he enough money to buy these things?



AS THE ROMANS DID

In the third and fourth grades, you learned how to write numbers as the Romans did. Instead of using figures as we do, they used letters to write numbers. You remember these letters were:

I = 1	V = 5	X = 10	L = 50
C = 100	D = 500	M = 1000	

1. Try to write all the Roman numbers from 1 to 12.

In order to write some of the numbers, the Romans used the same letter more than once, as:

II = 2; XX = 20; XXX = 30; CC = 200.

Sometimes they wrote a letter meaning a smaller number **after** a letter meaning a larger number, like VII. When they did this, they added the value of the smaller number, II, to the value of the larger number, V, making VII or 7.

VII (7) = V (5) + II (2)
XV (15) = X (10) + V (5)

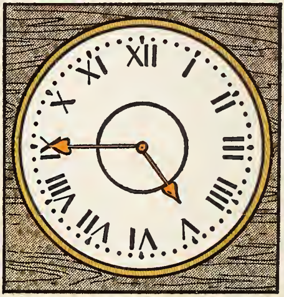
2. Write Roman numbers for 32, 55, 21, 17.

Sometimes the Romans wrote a letter meaning a smaller number **before** a letter meaning a larger number, like IV. When they did this, they subtracted the value of the smaller number from the value of the larger number; for example:

IV (4) = V (5) − I (1)
IX (9) = X (10) − I (1)
XC (90) = C (100) − X (10)

1. Write Roman numbers for 14, 24, 19, 91.

2. You can find Roman numbers used in America if you try to find them. Some clocks and watches have their numbers printed in the Roman way. Draw a clock face and write Roman numbers on it. Remember that clock faces use IIII instead of IV. Draw another face and write the numbers on it in the way we write numbers.



3. Sometimes the chapters of books are numbered in the Roman way. Look in all your schoolbooks and see if the chapters are numbered in Roman numbers. If they are, copy the number of the last chapter in each book and see if you can tell how many chapters there are.

4. Write in Roman numbers the number that tells how many years old you are. Write the number that tells what day in the month this is.

5. In business we sometimes use M for 1000 in writing numbers of brick or numbers of feet of lumber. We read 8 M brick, 8 thousand brick.

Read these numbers: 20 M shingles, 45 M brick, 30 M feet of flooring, 15 M fire brick at $30 per M.

6. On the cover of *St. Nicholas Magazine*, "Vol. XLV" means that this copy of the magazine belongs to volume number 45. Look at some of the magazines you have at home or in the school library and copy the volume number you find there. When the copies of a magazine for a year are put together like a book, we call it a volume.

7. Write in our numbers on your paper:

DXC	LVI	VII
MDXL	CLXIX	XIX

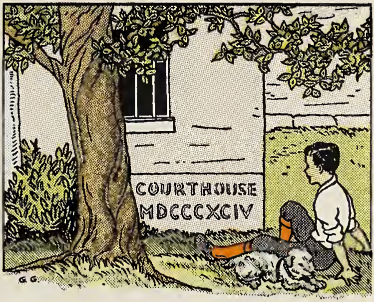
8. Read these Roman numbers.

XLIV	XXIX	LIII
XXXVIII	CLVI	DCCLXXVII

Read these sentences:

9. The date when the courthouse was built is carved in Roman numbers on the corner stone. It reads MDCCCXCIV.

10. The date on the corner stone of our new library reads MCMXXX.

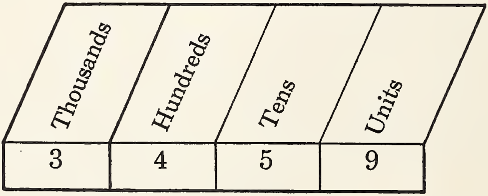


In writing numbers our way, we use the same figure in any place we want it: in units, tens, hundreds, or thousands. The **value** that a figure has is shown by the **place** it has in the numbers. Look at these numbers and see how the figure 2 changes its value.

2, 20, 200, 2000

In the first number above, 2 means just 2 units. In the next number (20), 2 means 2 tens. The next number is 200. In this number 2 means 2 hundreds. In the last number (2000), 2 means 2 thousands.

Draw lines like those below with a heavy line at the right and another heavy line at the thousands' column, like this:



See how we write 3459 in these columns.

a. We write 3 in the thousands' place, on the left side of the heavy line. It means 3 thousands.

b. We write 4 in the hundreds' column, for it means 4 hundreds.

c. Then we put 5 in the tens' column, for it means 5 tens.

d. Last we write 9 in the units' column, for it means 9 ones.

Rule your paper in columns, with light lines and heavy lines, like those below. Then write names over the columns, as they are written here.

Billions			Millions			Thousands			Hun-dreds	Tens	Units
								6	7	2	8
							2	1	9	6	1
							3	0	3	0	0
					1	2	3	7	1	0	2
				2	1	0	7	4	0	2	1

1. Write the following numbers in the ruled columns.

6728 21961 30300 1237102 21074021

The numbers when they are written in columns say:

6 thousand, 728.
21 thousand, 961.
30 thousand, 300.
1 million, 237 thousand, 102.
21 million, 74 thousand, 21.

2. Write these numbers in your ruled columns, and then study so that you can read them easily. Do not use "and" when you read these numbers.

68000	263458	756205	100016
2401924	1006807	4900900	26016103
98211000	10000000	102600004	360279112

Your first number should look like this:

	6	8	0	0	0

It is read 68 thousand. What do the 0's tell you?

When you can read and write numbers well, you will not need the ruled columns. You will use commas instead of the heavy lines, like this:

Millions	Thousands	Hundreds	Tens	Units
– – – ,	– – – ,	–	–	–

See how this number looks: 283,491,765

Read it, 283 million, 491 thousand, 765.

Write these numbers in a column, using commas. Keep the millions in straight columns in millions' place, the thousands in thousands' place, and so on, as if you were getting ready to add. Watch for places that are to have nothing in them but 0's.

This is the way the second number should look.
10,006,010

1.	130 million	179 thousand	500
2.	10 million	6 thousand	10
3.	6 million	40 thousand	109
4.	47 million	100 thousand	507
5.		23 thousand	11
6.	900 million	16 thousand	800
7.	90 million	300 thousand	50
8.	3 million	3 thousand	3
9.	1 million	83 thousand	530
10.	2 million		40
11.	10 million		400
12.		120 thousand	

Read the numbers you have written. See if you read them as they are written above. If not, check and see where you have made a mistake.

In newspapers you find many sentences with large numbers. Practice reading the large numbers below and on the next page.

1. When Columbus came to America, there were about 846,000 Indians here. By 1930 the number of Indians was only 332,397.

2. As many as 5,500,000 automobiles have been made in one year in the United States and Canada.

3. Wiley Post and Harold Gatty flew 15,495 mi. in their flight around the world.

4. A telescope, costing about $12,000,000, is being built at Mt. Wilson observatory in California.

5. The United States and Canada are planning to build a waterway on the St. Lawrence river. It will cost $800,000,000 and the United States plans to pay $400,000,000 of the cost.

6. The sun is 1,300,000 times as large as the earth. It is about 93,000,000 miles away from the earth. The moon is not nearly as far away. It is about 239,000 miles from the earth.

7. When Jack returned from his trip in the West last summer, he told us many interesting things about national forests. He said that Idaho has more acres in national forests than any other state. It has 19,279,539 acres.

8. In 1930 New York, the largest city in America, had 6,930,446 people living in it. Chicago, the second largest city, had a population of 3,376,438.

9. In one year in New York City, fires destroyed property valued at $16,994,030.

On your paper write in figures all the large numbers in the problems below:

10. Over thirty-seven million people are attending the Sunday schools of the world.

11. If three million pupils were carried to school by bus and each pupil averaged one hundred sixty days in school in one year, the total number of round trips by bus was four hundred eighty million. If you count the trips separately to and from school each day, the whole number of rides was nine hundred sixty million. That is almost one billion.

12. There were two hundred fifty-seven thousand, five hundred twenty-one public school buildings in the United States in 1928.

13. The world's largest uncut gem is a diamond, larger than a hen's egg. It was purchased by an American for seven hundred thirty thousand dollars.

14. In 1927 only about thirteen thousand passengers were carried by airplanes. In 1931 the number had increased to more than two million, three hundred eighty-nine thousand.

IN GLACIER PARK

In each problem tell whether you should add or subtract. Then solve the problem.

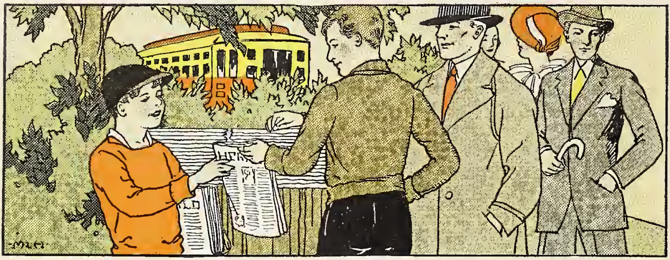
1. A ranger in Glacier Park says there are 439 mountain goats, 110 moose, 1061 mule deer, 1656 white-tail deer, 239 bighorn sheep, 486 elk, 105 grizzly bears, and 335 black bears in the park. How many of these animals are in the park?

2. Billy needs a new tire for his bicycle. The tire will cost $1.50. He has just 95¢ in his bank. How much more money must he have to buy the tire?

3. John bought potatoes for 28¢, cake flour for 24¢, and bananas for 15¢. How much did these cost?

4. Mrs. Lang's largest expenses each month are $55 for rent, $48 for food, $3 for reading, and $8 for amusements. How much should she allow for these things each month?

5. Mary should weigh 81 pounds. She weighs only 69 pounds. How much must she gain to be the right weight?



SEEING HOW MUCH THINGS COST

1. Carl sells a 2-cent daily paper at a stand. How much money should he have from the sale of 6 papers? Of 4? Of 8? 3? 7? 2? 9? 5?

Multiply the price, 2¢, by the number sold.

2. The Red Front market sells some cuts of meat at 24¢ a pound. How much money should be paid for 3 pounds (lb.) at that price?

$$\boxed{\begin{array}{r} 24 \\ 3 \\ \hline 72 \end{array}}$$

To find how much should be paid for 3 lb., **multiply** the price, 24¢, by 3.

Think: 3 times 4, 12. Write 2 under 3 and remember 1.

Think: 3 times 2, 6; 6+1 remembered, 7. Write 7 at the left of 2 in the product.

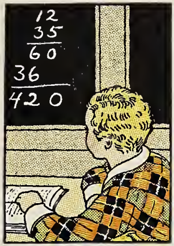
The product is 72.

72 cents should be paid for 3 lb.

3. Mr. Jones has boys' shoes at $3.75 a pair. At this price how much should he get for 6 pairs?

4. Tickets to the movies cost Ann 15¢ each. How much will it cost her to go 9 times?

HAVE YOU FORGOTTEN?



Last year you learned how to do examples and solve problems in multiplication. How much do you remember of what you learned?

1. Edward promised to take 35 cartons of fresh eggs to Pierce Brothers. Each carton holds a dozen eggs. How many eggs did he promise to take? $35 \times 12 = ?$

(a) Look at the blackboard. Where should you begin to multiply?

(b) We call 5×2 a **multiplication fact.** Give two more multiplication facts.

(c) How many multiplication facts are there? How many do you know?

(d) After you say $5 \times 2 = 10$ in the example, what do you do with the 0 in 10? What with the 1 in 10?

(e) Tell where the 60 came from.

(f) When you say $3 \times 2 = 6$, how do you know where to write the 6?

(g) The numbers 60 and 36 are called **partial products.**

(h) What do you do with these partial products after writing them?

(i) How do you check multiplication?

(j) Can you multiply money numbers?

(k) What is a short way to multiply any number by 10?

HELPING YOU TO REMEMBER

1. One day Vera went with her father to buy feed for the horses. He bought 18 bushels of corn at 65¢ a bushel. Vera tried to find how much her father should pay for the corn. How much should he pay? $18 \times 65¢ = ?$

$$\begin{array}{r} 65 \\ \underline{18} \\ 520 \\ \underline{65} \\ 1170 \end{array}$$

Multiply 65¢ by 18.

Write the multiplier under the multiplicand, units under units and tens under tens.

Multiply: $8 \times 5 = 40$. Write 0 under the multiplier 8. Remember the 4.

Multiply: $8 \times 6 = 48$, and 4 remembered are 52. Write 52 in the product to the left of 0.

Multiply: $1 \times 65 = 65$. Write the product 65 on a new line with the 5 under 1 of 18.

Draw a line and add the two products as written. The complete product is 1170.

As this is a money problem, we must point off two places for the cents and use the dollar sign. Write this number in this way, $11.70.

Vera's father should pay $11.70 for the corn.

Mastering the Multiplication Facts

On the next page you will find the 100 multiplication facts that you use when you multiply one number by another number. To be strong in multiplication you should be able to say the products in these examples in 3 minutes or less. Have a classmate check as you try to say the products in all these examples.

1	4	5	5	1	6	2	3	1	7
5	1	2	1	2	1	2	1	3	1
2	1	2	8	0	1	3	3	1	4
3	7	5	2	1	6	2	3	9	5
7	2	0	1	2	0	4	0	3	3
2	1	2	4	0	5	2	3	4	0
2	0	5	9	0	5	0	1	6	2
7	8	5	1	0	3	6	8	0	4
8	1	0	1	4	4	6	5	2	3
1	0	4	1	0	4	2	0	8	5

6	8	5	0	7	2	9	0	2	9
3	0	6	9	0	9	0	7	6	2
5	4	3	7	3	9	7	4	9	7
4	3	6	5	7	9	3	6	5	7
6	5	9	8	6	8	5	8	3	6
4	7	3	3	6	5	9	4	9	5
4	9	8	5	7	6	3	6	7	4
7	4	8	8	4	8	8	7	6	9
8	4	8	8	9	6	9	7	9	7
6	8	9	7	8	9	7	8	6	9

1. Copy on paper the multiplication facts that you could not give correctly and quickly in the test on page 37. Under each of the examples write the product.

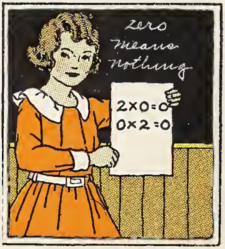
2. Turn to the 100 multiplication facts on page 37. Cover the products with a piece of paper, a row at a time, and see how fast you can say them.

3. Below are some products that are harder to remember than others. Say these until you can say them quickly. (Read the first one, 7 times $9 = 63$, the second, 7 times $8 = 56$.)

(a)	9	8	9	7	9	8	7	8
	7	7	4	6	6	6	4	9
	63	56	36	42	54	48	28	72

(b) You read the first example in exercise (a): "7 times 9 equals 63." Now make examples with the numbers changed: "9 times 7 equals 63." Change all the examples in exercise (a) in that way.

4. Some pupils have trouble with 0 in numbers when they multiply. **Always remember that zero means nothing.** If you multiply 30 by 7, how many are 7 times 0? If you multiply by 0, the product is 0. How many are 0 times 2? 2 times 0? Say the products:



0	6	3	0	9	4	1	5	8
7	0	0	1	0	0	0	0	0

EDGAR'S STAMPBOOK

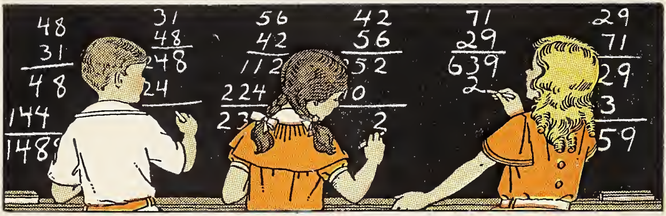
1. Edgar has a new stampbook which he received for his birthday. The book has 32 pages and each page has places for 24 stamps. If Edgar fills the book, how many stamps will he need? $32 \times 24 = ?$

$$\begin{array}{rl} 24 & \textbf{Multiplicand} \\ \underline{32} & \textbf{Multiplier} \\ 48 & \textbf{First Product} \\ \underline{72} & \textbf{Second Product} \\ 768 & \textbf{Product} \end{array}$$

Think: $2 \times 4 = 8$. Write 8 under 2 in 32.
$2 \times 2 = 4$. Write 4.
Next, $3 \times 4 = 12$. Write the 2 under 3 in 32 and remember the 1.
$3 \times 2 = 6$. $6 + 1$ remembered $= 7$. Write 7.
Draw a line. Add.
The product is 768.
Edgar will need 768 stamps.

> **The multiplicand is the number multiplied.**
> **The multiplier is the number by which you multiply.**
> **The product is the answer you get by multiplying.**

When the multiplier has more than one figure, begin to multiply with units' figure. You will have a first product, a second product, and so on. Begin to write each product exactly under the figure you are multiplying by. Then add to find the whole product.



To check multiplication, use the multiplier as a multiplicand and use the multiplicand as multiplier. The product of two numbers is always the same, no matter which number is written first.

Check

32	**Multiplicand**
24	**Multiplier**
128	**First Product**
64	**Second Product**
768	**Product**

Multiply in the following examples. Mark which number is the multiplicand, which is the multiplier, and which is the product. Then check each example.

1.	48 31	56 42	71 29	39 91	76 28	95 63
2.	74 49	39 57	82 38	68 67	465 58	182 89
3.	298 24	517 47	923 19	671 141	148 264	586 657
4.	732 376	591 159	493 256	847 369	714 268	396 187

ANNE'S MUSIC LESSON

1. Anne practiced her music 45 minutes every day in September (30 days). How many minutes did she practice in the whole month of September? $30 \times 45 = ?$

$$\begin{array}{r} 45 \\ \underline{30} \\ 1{,}350 \end{array}$$

Think: $0 \times 45 = 0$. Write 0 in the product under 0, the multiplier.

$3 \times 5 = 15$. Write 5 under 3. Remember 1.

$3 \times 4 = 12$. $12 + 1$ remembered $= 13$. Write 13.

The product is 1,350.

Anne practiced 1,350 minutes in September.

2. Multiply 354 by 300.

$$\begin{array}{r} 354 \\ \underline{300} \\ 106{,}200 \end{array}$$

Think: $0 \times 354 = 0$. Write 0 under 0.

Again $0 \times 354 = 0$. Write 0 under 0.

Then multiply by 3. $3 \times 4 = 12$. Place the 2 of 12 under 3. Finish the example.

The product is 106,200.

> **When you multiply by 0, write 0 in the product under the multiplier.**

Multiply and check:

3. 74	35	27	18	86	90	67
60	20	50	90	80	70	70

MR. ANDERSON'S FARM

1. Mr. Anderson owns a farm of 607 acres in the corn belt. He says it is worth \$125 per acre. At what price does he value the farm? $607 \times \$125 = ?$

$$\begin{array}{r} 125 \\ \underline{607} \\ 875 \\ \underline{7500} \\ 75{,}875 \end{array}$$

Think: 7×125 and write 875, placing the 5 under 7, the multiplier.
$0 \times 125 = 0$. Write 0 under 0, the multiplier.
$6 \times 125 = 750$. Write this beside the 0, placing the 0 in 750 under 6, the multiplier.
Draw a line and add. The product is 75,875. The farm is valued at \$75,875.

2. Multiply 1421 by 3002.

$$\begin{array}{r} 1421 \\ \underline{3002} \\ 2842 \\ \underline{426300} \\ 4{,}265{,}842 \end{array}$$

Think: 2×1421. Write 2842.
$0 \times 1421 = 0$. Write the 0 under 0.
$0 \times 1421 = 0$. Write the 0 under 0.
$3 \times 1421 = 4263$. Write it beside the 00, placing the last 3 in the product under 3, the multiplier.
Draw a line and add. The product is 4,265,842.

> Reminder: Put the right-hand figure of each product under the figure you are using as a multiplier.

Copy these examples and finish multiplying them.

3.

458	736	3627	6127	3841
204	506	703	5004	6008
1832	4416	10882	24508	30728
0	0	0	00	00

1. Fire in a tailor shop destroyed 75 suits worth $40 each. What was the total value of these suits? $75 \times 40 = ?$

$$\begin{array}{r} 40 \\ \underline{75} \\ 200 \\ \underline{280} \\ 3{,}000 \end{array}$$

Think: $5 \times 0 = 0$. Write 0 under 5.
Think: $5 \times 4 = 20$. Write 20.
Think: $7 \times 0 = 0$. Write 0 under 7.
Think: $7 \times 4 = 28$. Write 28.
Add and find the product.
What was the value of all the suits?

2. A store has 80 boxes of typewriting paper containing 500 sheets each. How many sheets of paper are in the lot? $80 \times 500 = ?$

$$\begin{array}{r} 500 \\ \underline{80} \\ 40{,}000 \end{array}$$

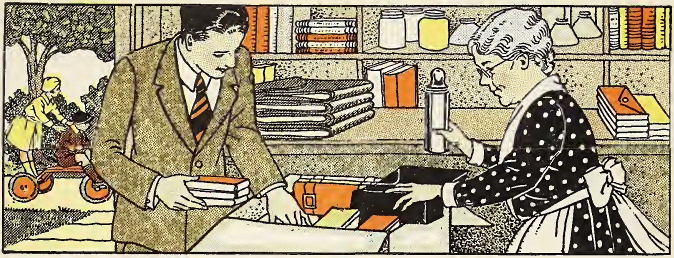
Think: 0 times $500 = 0$. Write 0 under 0.
Think: 8 times $0 = 0$. Write 0 under 8.
Think: 8 times $0 = 0$. Write another 0 in the product.
Think: 8 times $5 = 40$. Write 40 in the product to the left of the zeros.

The product is 40,000.
The boxes contain 40,000 sheets of paper.

When you have zeros in multiplying, be sure to use all of them.

Multiply and check:

3.	791 70	400 700	450 900	293 600	700 800
4.	350 200	978 400	605 300	100 100	999 900



BUYING SCHOOL SUPPLIES

This page shows how to multiply money numbers. Find how much the manager of the School Supply Store has to pay for the supplies in the list below.

1. 75 pencil boxes at 29¢ each.

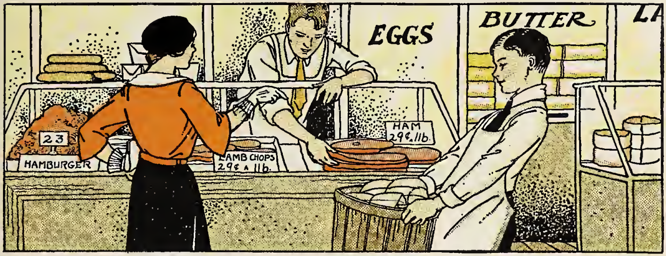
$$\begin{array}{r} \$\quad .29 \\ \underline{75} \\ 145 \\ \underline{203} \\ \$21.75 \end{array}$$

Think: If 1 box costs 29¢, 75 boxes will cost 75 times 29¢.
Multiply. Write the decimal point in the product by pointing off 2 places for cents. Write the dollar sign.
The product is \$21.75.
The manager should pay \$21.75.

2. 36 lunch kits with vacuum bottle at \$1.19.
3. 86 red carrying cases at 57¢.
4. 154 brief cases at \$1.37.
5. 370 fountain pens at 89¢.
6. 75 fountain pens at \$1.05.

Multiply and check.

7.	\$2.12	603	569	\$1.84	809
	28	809	705	40	300



JOHN WORKS IN THE MEAT MARKET

John worked at Steck's Meat Market every Saturday during vacation. Each morning he marked on the window the price of meat per pound. One Saturday he marked these prices on the window:

Chickens—Spring	$ .25	Ham	$ .29
Chickens—Stewing	.18	Bacon	.32
Turkey	.45	Lamb Chops	.29
Hamburger	.23	Shoulder of Lamb	.21
Roast Beef	.29	Short Ribs of Beef	.32

That day John filled 12 orders for meat. Find the cost of each order as it is listed below.

1. 10 lb. turkey
2. 2 lb. hamburger
3. 3 lb. bacon
4. 9 lb. turkey
5. 4 lb. ham
6. 5 lb. roast beef
7. 4 lb. stewing chicken
8. 6 lb. spring chicken
9. 3 lb. shoulder of lamb
10. 2 lb. lamb chops
11. 5 lb. short ribs of beef
12. 5 lb. spring chicken

FINDING OUR WEAK SPOTS

This test will help you to find your weak spots in multiplication. Number your paper the same as the exercises in the test. Copy the examples, and multiply.

1. Some Single Products More than 9

34	78	20	43	27	59	62	98
7	6	9	4	8	6	7	9

2. Two-Figure Multipliers

28	35	24	46	94	83	53	62
78	49	67	43	47	57	86	98

3. Checking Multiplication

Check each of the examples in exercise 2.

4. Multiplying by Zero in the Short Way

64	52	78	97	61	23	19	36
10	20	20	30	90	60	40	50

5. Multiplying Money Numbers

(a)	\$100.50	\$34.75	\$60.35	\$96.50	\$8.98	
	4	10	93	40	7	
(b)	\$385	\$400	\$900	85¢	60¢	\$10.05
	3	40	9	7	10	50

If you made mistakes in any of these exercises, practice the exercises numbered the same on the next page.

CURING OUR WEAK SPOTS

Copy the examples on a paper. Find the products.

1. Some Single Products More than 9

43	87	90	34	72	95	26	89
7	6	2	4	8	6	7	9

$2 \times 36 = ?$ $6 \times 52 = ?$ $8 \times 56 = ?$ $3 \times 49 = ?$

2. Two-Figure Multipliers

$$\begin{array}{r} 56 \\ \underline{47} \\ 392 \\ \underline{224} \\ 2632 \end{array}$$

Multiply by the units' figure.
$7 \times 56 = 392$. Write 392 with the 2 under the multiplier 7.
Multiply by the tens' figure.
$4 \times 56 = 224$. Write 224 with the 4 under the multiplier 4.
Add. The whole product is 2632.

82	53	42	64	49	38	35	26
87	94	76	34	74	75	68	89

3. Checking Multiplication

Check each example in exercise 2 by using the multiplier as the multiplicand.

4. Multiplying by Zero in the Short Way

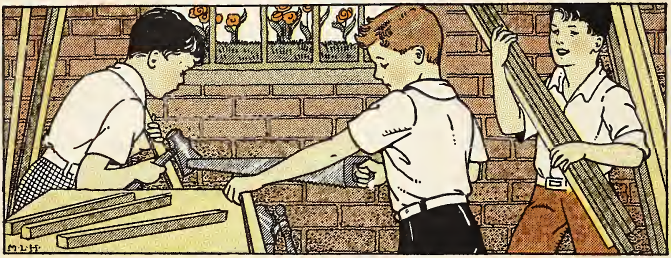
To multiply by a two-figure number ending in 0, write 0 in the product under 0 of the multiplier; then multiply by the tens' figure of the multiplier.

46	25	87	79	16	32	91	63
10	20	20	30	90	60	40	50

5. Multiplying Money Numbers

Multiply each number by 47: \$100.50 \$74.35 \$9.89 \$900. 90¢ \$.70 \$10.05 5¢ \$3.05

WINNERS' PAGE
For pupils who made no mistakes on page 46.



Find what you should do in each of the problems and ask the right question for the problem. Then find the answer to your question.

1. Grades 4, 5, and 6 will have a school garden. In the woodshop the boys are making the stakes for markers. They need to make 148 stakes for each grade.

2. We have ordered 550 tickets for our school programs. They are to sell at 25¢ each.

3. Tom thinks his grandfather must have 1000 rose bushes in his rose garden. There really are 13 rows of bushes with 62 bushes in each row.

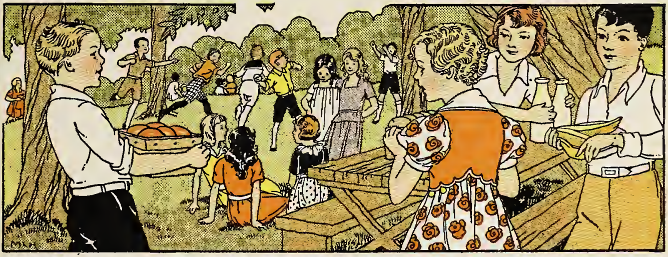
4. We have 26 Boy Scouts who are going camping. Each boy will pay $2.50 a week toward expenses.

5. The boys in the school orchestra are raising money to buy new electric lights for their music racks. Each of the 18 boys needs to raise $3.75.

6. An aviator averages 102 miles an hour in an 11-hour flight from Chicago to Atlanta.

CHAPTER II

PROBLEMS AND TERMS IN DIVISION



BUYING THINGS FOR A CLASS PICNIC

1. Ed's class is planning a picnic. Ed is one of the boys bringing apples. If apples cost 5¢ each, how many can he get for 25¢?

2. May was asked to bring rolls. They cost 2¢ each. How many can she get for 30¢?

3. Bob has 15¢ to buy bananas. How many can he buy at 3¢ apiece?

4. The class wants several pupils to bring milk. If one quart makes 4 glasses, how many quarts will be needed to give each of the 28 pupils a glass?

Do you remember the terms you use in division?

> **The dividend is the number that you divide.**
> **The divisor is the number you divide by.**
> **The quotient is the answer you get by dividing.**

Name the dividend, the divisor, and the quotient in each of the problems above.

In the fourth grade you learned how to divide by a one-figure number, how to check division to be sure you had not made any mistakes, and how to use division in solving a problem.

In grade five you will go over these things to see how well you remember them. Then you will learn how to divide by a number of more than one figure. The lessons that you will study in division will help you to do many harder things than those you have done before.

Knowing the Division Facts

In all your work in division you will need to know the 90 division facts. These are division examples in which you have dividends up to 81 and one-figure divisors. On the next page you will find each of these examples with their quotients.

1. Cover the quotients with a strip of paper, a row at a time. Look at the examples and see how fast you can say the quotients correctly. If you forget one, you may lift the paper.

2. Make a list of the examples that you cannot answer quickly. Say these examples with their quotients until you know them well.

3. Work sometimes with another pupil to see if you can say all the quotients correctly in 4 minutes.

4. Practice on the examples that are hard for you until you have learned to say all the quotients correctly in 4 minutes.

$\begin{array}{r}1\\ 2\overline{)2}\end{array}$	$\begin{array}{r}1\\ 7\overline{)7}\end{array}$	$\begin{array}{r}3\\ 8\overline{)24}\end{array}$	$\begin{array}{r}1\\ 9\overline{)9}\end{array}$	$\begin{array}{r}1\\ 5\overline{)5}\end{array}$	$\begin{array}{r}8\\ 8\overline{)64}\end{array}$	$\begin{array}{r}8\\ 6\overline{)48}\end{array}$
$\begin{array}{r}7\\ 4\overline{)28}\end{array}$	$\begin{array}{r}1\\ 4\overline{)4}\end{array}$	$\begin{array}{r}6\\ 8\overline{)48}\end{array}$	$\begin{array}{r}6\\ 4\overline{)24}\end{array}$	$\begin{array}{r}1\\ 1\overline{)1}\end{array}$	$\begin{array}{r}7\\ 9\overline{)63}\end{array}$	$\begin{array}{r}0\\ 4\overline{)0}\end{array}$
$\begin{array}{r}2\\ 1\overline{)2}\end{array}$	$\begin{array}{r}9\\ 4\overline{)36}\end{array}$	$\begin{array}{r}0\\ 5\overline{)0}\end{array}$	$\begin{array}{r}0\\ 6\overline{)0}\end{array}$	$\begin{array}{r}7\\ 7\overline{)49}\end{array}$	$\begin{array}{r}0\\ 9\overline{)0}\end{array}$	$\begin{array}{r}6\\ 7\overline{)42}\end{array}$
$\begin{array}{r}5\\ 8\overline{)40}\end{array}$	$\begin{array}{r}1\\ 3\overline{)3}\end{array}$	$\begin{array}{r}6\\ 9\overline{)54}\end{array}$	$\begin{array}{r}4\\ 9\overline{)36}\end{array}$	$\begin{array}{r}9\\ 8\overline{)72}\end{array}$	$\begin{array}{r}1\\ 6\overline{)6}\end{array}$	$\begin{array}{r}0\\ 2\overline{)0}\end{array}$
$\begin{array}{r}4\\ 7\overline{)28}\end{array}$	$\begin{array}{r}3\\ 6\overline{)18}\end{array}$	$\begin{array}{r}7\\ 8\overline{)56}\end{array}$	$\begin{array}{r}0\\ 7\overline{)0}\end{array}$	$\begin{array}{r}9\\ 7\overline{)63}\end{array}$	$\begin{array}{r}8\\ 3\overline{)24}\end{array}$	$\begin{array}{r}9\\ 6\overline{)54}\end{array}$
$\begin{array}{r}0\\ 8\overline{)0}\end{array}$	$\begin{array}{r}9\\ 3\overline{)27}\end{array}$	$\begin{array}{r}8\\ 9\overline{)72}\end{array}$	$\begin{array}{r}9\\ 1\overline{)9}\end{array}$	$\begin{array}{r}8\\ 1\overline{)8}\end{array}$	$\begin{array}{r}4\\ 4\overline{)16}\end{array}$	$\begin{array}{r}4\\ 5\overline{)20}\end{array}$
$\begin{array}{r}4\\ 6\overline{)24}\end{array}$	$\begin{array}{r}9\\ 5\overline{)45}\end{array}$	$\begin{array}{r}7\\ 1\overline{)7}\end{array}$	$\begin{array}{r}4\\ 2\overline{)8}\end{array}$	$\begin{array}{r}0\\ 1\overline{)0}\end{array}$	$\begin{array}{r}7\\ 6\overline{)42}\end{array}$	$\begin{array}{r}3\\ 4\overline{)12}\end{array}$
$\begin{array}{r}6\\ 2\overline{)12}\end{array}$	$\begin{array}{r}2\\ 3\overline{)6}\end{array}$	$\begin{array}{r}2\\ 9\overline{)18}\end{array}$	$\begin{array}{r}8\\ 5\overline{)40}\end{array}$	$\begin{array}{r}5\\ 3\overline{)15}\end{array}$	$\begin{array}{r}8\\ 4\overline{)32}\end{array}$	$\begin{array}{r}2\\ 8\overline{)16}\end{array}$
$\begin{array}{r}3\\ 7\overline{)21}\end{array}$	$\begin{array}{r}7\\ 2\overline{)14}\end{array}$	$\begin{array}{r}9\\ 2\overline{)18}\end{array}$	$\begin{array}{r}4\\ 1\overline{)4}\end{array}$	$\begin{array}{r}7\\ 3\overline{)21}\end{array}$	$\begin{array}{r}2\\ 5\overline{)10}\end{array}$	$\begin{array}{r}2\\ 4\overline{)8}\end{array}$
$\begin{array}{r}5\\ 4\overline{)20}\end{array}$	$\begin{array}{r}6\\ 5\overline{)30}\end{array}$	$\begin{array}{r}3\\ 2\overline{)6}\end{array}$	$\begin{array}{r}8\\ 7\overline{)56}\end{array}$	$\begin{array}{r}6\\ 1\overline{)6}\end{array}$	$\begin{array}{r}4\\ 3\overline{)12}\end{array}$	$\begin{array}{r}9\\ 9\overline{)81}\end{array}$
$\begin{array}{r}5\\ 9\overline{)45}\end{array}$	$\begin{array}{r}4\\ 8\overline{)32}\end{array}$	$\begin{array}{r}3\\ 5\overline{)15}\end{array}$	$\begin{array}{r}3\\ 3\overline{)9}\end{array}$	$\begin{array}{r}5\\ 6\overline{)30}\end{array}$	$\begin{array}{r}7\\ 5\overline{)35}\end{array}$	$\begin{array}{r}2\\ 6\overline{)12}\end{array}$
$\begin{array}{r}5\\ 2\overline{)10}\end{array}$	$\begin{array}{r}3\\ 1\overline{)3}\end{array}$	$\begin{array}{r}3\\ 9\overline{)27}\end{array}$	$\begin{array}{r}6\\ 6\overline{)36}\end{array}$	$\begin{array}{r}5\\ 5\overline{)25}\end{array}$	$\begin{array}{r}5\\ 7\overline{)35}\end{array}$	$\begin{array}{r}5\\ 1\overline{)5}\end{array}$
$\begin{array}{r}8\\ 2\overline{)16}\end{array}$	$\begin{array}{r}2\\ 2\overline{)4}\end{array}$	$\begin{array}{r}6\\ 3\overline{)18}\end{array}$	$\begin{array}{r}2\\ 7\overline{)14}\end{array}$	$\begin{array}{r}0\\ 3\overline{)0}\end{array}$	$\begin{array}{r}1\\ 8\overline{)8}\end{array}$	

See how quickly you can say the quotients in these examples without making mistakes. When you have a remainder, as in $8\overline{)34}$, say the quotient this way: "4 and 2 remainder."

1.	$7\overline{)49}$	$9\overline{)56}$	$6\overline{)54}$	$9\overline{)45}$	$3\overline{)27}$	$7\overline{)56}$
2.	$6\overline{)23}$	$7\overline{)29}$	$8\overline{)53}$	$6\overline{)36}$	$6\overline{)48}$	$8\overline{)48}$
3.	$9\overline{)75}$	$7\overline{)46}$	$4\overline{)36}$	$9\overline{)72}$	$9\overline{)63}$	$8\overline{)40}$

A Longer Example

4. Our potato patch has in it 675 hills of potatoes. There are 5 rows, each having the same number of hills. How many hills are there in a row? $675 \div 5 = ?$

$$
\begin{array}{r}
135 \\
5\overline{)675} \\
\underline{5} \\
17 \\
\underline{15} \\
25 \\
\underline{25}
\end{array}
$$

Check

$$
\begin{array}{r}
135 \\
\underline{5} \\
675
\end{array}
$$

(1) **Divide**: How many 5's in 6? 1. Write 1 over 6.
(2) **Multiply**: $1 \times 5 = 5$. Write 5 under 6.
(3) **Subtract**: 5 from $6 = 1$
(4) **Bring down** 7.
(1) **Divide**: How many 5's in 17? 3. Write 3 in the quotient over 7.
(2) **Multiply**: $3 \times 5 = 15$. Write 15 under 17.
(3) **Subtract**: 15 from $17 = 2$
(4) **Bring down** 5 and finish.

The quotient is 135.

Check by multiplying.

How many hills are in a row?

To check division, multiply the divisor by the quotient. The product should be the same as your dividend.

1. Jack sells the *Daily Herald*. He sells each paper for 3¢. On Saturday his sales were \$1.23. How many papers did he sell that day? $\$1.23 = 123¢$. $123 \div 3 = ?$

Divide

$$\begin{array}{r} 41 \\ 3\overline{)123} \\ \underline{12} \\ 3 \\ \underline{3} \end{array}$$

Check

$$\begin{array}{r} 41 \\ \underline{3} \\ 123 \end{array}$$

(1) Divide: How many 3's in 12? 4. Write 4 over 2.
(2) Multiply: $4 \times 3 = 12$. Write 12 under 12.
(3) Subtract: 12 from $12 = 0$. Do not write 0.
(4) Bring down 3.
(1) Divide: How many 3's in 3? 1. Write 1 in the quotient over 3.
(2) Multiply: $1 \times 3 = 3$. Write 3 under the 3 brought down.
(3) Subtract: 3 from $3 = 0$

Jack sold 41 papers.

A figure in the quotient is written over the last figure used in the dividend.

Copy and divide.

2. $3\overline{)642}$ $5\overline{)690}$ $4\overline{)736}$ $6\overline{)930}$ $2\overline{)468}$

3. $5\overline{)615}$ $4\overline{)464}$ $8\overline{)992}$ $3\overline{)492}$ $7\overline{)784}$

4. $8\overline{)976}$ $9\overline{)648}$ $7\overline{)483}$ $9\overline{)477}$ $6\overline{)108}$

5. Florence had \$2.64 with which to buy little cakes for the school party. The cakes she bought cost 4¢ each. How many cakes could she get with the money? $\$2.64 = 264¢$

1. When Jane and Elsie came from school, their mother told them they could have the cookies that were left from lunch. They found 5 cookies in the jar. How many did each girl have, if they divided them equally? $5 \div 2 = ?$

$$\begin{array}{r} 2\frac{1}{2} \\ 2\overline{)5} \\ \underline{4} \\ 1 \text{ r} \end{array}$$

Divide 5 by 2. Each girl gets 2 whole cookies.

There is 1 cookie left over. Divide it in two equal parts.

Each girl had $2\frac{1}{2}$ cookies.

Do you see that $1 \div 2 = \frac{1}{2}$? $1 \div 2$ may be written $\frac{1}{2}$.

The remainder in division is usually written as a fraction.

Divide. Write the remainders as fractions.

2. $389 \div 8 = ?$ $\quad 456 \div 5 = ?$ $\quad 397 \div 4 = ?$

3. $8\overline{)369}$ $\quad 3\overline{)670}$ $\quad 4\overline{)397}$ $\quad 5\overline{)599}$ $\quad 7\overline{)848}$

4. Divide 790 by 7. Divide 270 by 7.

5. $\frac{1}{8}$ of $271 = ?$ $\quad \frac{1}{9}$ of $866 = ?$ $\quad \frac{1}{7}$ of $638 = ?$

When the remainder in division is written as a fraction, the remainder is the numerator of the fraction and the divisor is the denominator.

The remainder in division is not always written as a fraction. One may write $\frac{1}{4}$ dollar, but not $\frac{1}{4}$ of a boy or hat.

In the next examples do not show the remainder as a fraction. Mark it r at the end of your work.

1. $8\overline{)898}$ $4\overline{)205}$ $7\overline{)148}$ $6\overline{)872}$

2. $725 \div 4 = ?$ $385 \div 2 = ?$ $152 \div 9 = ?$ $549 \div 6 = ?$

3. Divide 488 by 6. Divide 860 by 7.

4. $\frac{1}{3}$ of $454 = ?$ $\frac{1}{4}$ of $645 = ?$ $\frac{1}{8}$ of $139 = ?$

5. Ruth handed the clerk 25 cents to pay for oranges that cost 6 cents each. How many oranges did she get? How much change was left over?

6. On her way home from school Ruth bought 8 cookies at 3¢ each. She handed the clerk 25¢. How much did all the cookies cost? How much change was left over?

Divide

$$\begin{array}{r} 5 \\ 7\overline{)40} \\ \underline{35} \\ 5\ \text{r} \end{array}$$

Check

$5 \times 7 + 5 = 40$

7. David's mother sent him to the store with 40¢ to buy soap. David found that soap was on sale for 7¢ a bar. How many bars could he buy? How many cents did he have left over? Write r after the remainder.

Check by multiplying and adding the remainder to the product.

To check division when you have a remainder, add the remainder to the product of the divisor and quotient.

MR. BENNETT'S PAY DAY

1. Mr. Bennett was paid the same amount each month. In 9 months he earned \$1836. How much was this a month? $\$1836 \div 9 = ?$

Divide

$$\begin{array}{r} \$\ 204 \\ 9\overline{)\$1836} \\ \underline{18} \\ 36 \\ \underline{36} \end{array}$$

Check

$$\begin{array}{r} \$\ 204 \\ \underline{9} \\ \$1836 \end{array}$$

(1) Divide: How many 9's in 18? 2. Write 2 over 8.
(2) Multiply: $2 \times 9 = 18$. Write 18 under 18.
(3) Subtract: 18 from $18 = 0$. Do not write 0.
(4) Bring down 3.
(1) Divide: How many 9's in 3? None. Write 0 in the quotient over 3.
(4) Bring down 6.
(1) Divide: How many 9's in 36? 4. Write 4 in the quotient over 6.
(2) Multiply: $4 \times 9 = 36$. Write 36 under 36.
(3) Subtract: 36 from $36 = 0$

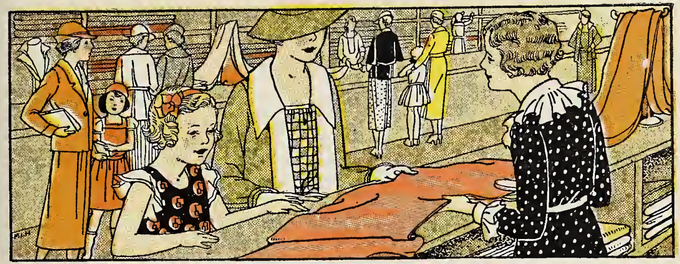
Mr. Bennett earned \$204 a month.

The steps in division are:
(1) **Divide**
(2) **Multiply**
(3) **Subtract**
(4) **Bring down**

Divide and check. Watch for zero.

2. $7\overline{)4907}$ $\quad 9\overline{)4518}$ $\quad 8\overline{)3360}$ $\quad 6\overline{)6126}$

3. $3\overline{)3276}$ $\quad 7\overline{)4760}$ $\quad 6\overline{)6234}$ $\quad 7\overline{)4200}$



VELVET FOR BETTY'S COAT

1. Mrs. Booth paid \$4.50 for 3 yards of velvet to make Betty a new coat. How much did the velvet cost per yard? $\$4.50 \div 3 = ?$

Divide

$$\begin{array}{r} \$1.50 \\ 3\overline{)\$4.50} \\ \underline{3} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

Check

$$\begin{array}{r} \$1.50 \\ \underline{3} \\ \$4.50 \end{array}$$

Divide as before.

Place the decimal point in the quotient right above the decimal point in the dividend.

The velvet cost \$1.50 a yard.

Divide and check.

2.	$5\overline{)\$36.45}$	$9\overline{)\$72.18}$	$7\overline{)\$12.81}$	$4\overline{)\$12.48}$
3.	$3\overline{)\$327}$	$7\overline{)\$49.14}$	$6\overline{)\$11.46}$	$8\overline{)\$10.40}$
4.	$6\overline{)4806}$	$9\overline{)9720}$	$2\overline{)\$18.16}$	$5\overline{)5455}$

HOW FAST DID HE DRIVE?

1. It took Mr. Olson 3 hours to drive home last night. He drove only 15 miles the first hour through city traffic. The next hour he drove 25 miles, and the last hour he drove 41 miles on country highways. How many miles did he average per hour?

15 miles 25 miles 41 miles

15 mi.
25 mi.
41 mi.
81 mi.

To find how far he drove, add 15, 25, and 41. Mr. Olson drove 81 miles in the 3 hours.

If he drove 81 miles in 3 hours, the average would be 81 miles divided by 3, or 27 miles.

Mr. Olson averaged 27 miles per hour.

To find the average, you added all the miles—15, 25, and 41. You then divided the sum, 81, by 3.

The average per hour means how fast he would have driven if he had made the same speed all the time.

27 miles 27 miles 27 miles

2. When Mr. Olson took a trip to Michigan, he drove 307 miles the first day, 300 miles the second day, and 350 miles the third day. How many miles did he average a day for the three days?

JEAN'S AVERAGE SCORE

3. Jean had 10 arithmetic problems every day last week. She had 10 right Monday, 8 Tuesday, 8 Wednesday, 9 Thursday, and 10 Friday. How many did she average right a day?

Step 1. Add: $10+8+8+9+10=?$
Jean got 45 problems right for the week.

Step 2. Divide: $45\div 5=?$
She averaged 9 right a day.

4. The boys on the sixth grade basketball team weigh: 87 pounds, 110 pounds, 90 pounds, 93 pounds, and 104 pounds. What is the average weight of the boys on this team?

5. Mrs. Jackson bought new winter coats for her girls. She paid $11.50 for Betty's, $15 for Ann's, and $21.50 for Jane's. What was the average price of the coats?

6. When we were planning to drive to camp, father said we must average at least 210 miles a day. The first day of the trip we drove 205 miles; the second day, 245 miles; and the third day, 180 miles. Did we average what father had planned?

7. Fred had 3 spelling tests this week. Each test had 20 words. In the first test Fred spelled 17 words correctly, in the second test 15, and in the third test 19. What was his average?

8. The week before last James made $.96 delivering papers. Last week he made only $.85. This week he made $1.05. What was the average amount he made for the three weeks?

In daily life many people divide numbers in the way you see in the problems below. They **think** each step and write only the quotient. They save time by dividing this short way.

1. The Clark school has 846 pupils. If they are all in a parade, marching by 2's, how many pairs of pupils are in the line? $846 \div 2 = ?$

$$\begin{array}{r} 423 \\ 2\overline{)846} \end{array}$$

Divide 846 by 2.
The divisor 2 divides each figure in the dividend without a remainder.
The quotient is 423.
There are 423 pairs of pupils in the line.

You have learned that sometimes in dividing you may have a remainder before the end. In problem 2 see how to do such examples in the short way.

2. The Adams school has 728 pupils marching by 2's in the parade. How many pairs of pupils are in that line? $728 \div 2 = ?$

$$\begin{array}{r} 364 \\ 2\overline{)728} \end{array}$$

Divide 728 by 2.
Think: How many 2's in 7? 3, and 1 r (1 remainder). Write 3 in the quotient over 7.

Think: The new number to be divided is 12. It is made up of 1 (remainder) and the next dividend figure to the right, 2.

Think: How many 2's in 12? 6. Write 6 in the quotient over 2.

Think: How many 2's in 8? 4. Write 4. The quotient is 364.

There are 364 pairs of pupils in the line.

In dividing in the short way, use each remainder with the next dividend figure to the right to make up the new number to divide. You may also have a remainder at the end of the example.

3. George's father keeps a record of the money he earns. During the first 8 months of the year he earned \$1795. He asked George to tell him what was the monthly average. Find the monthly average. $\$1795 \div 8 = ?$

$$\begin{array}{r} \$\ 224\tfrac{3}{8} \\ 8\overline{)\$1795} \end{array}$$

Divide \$1795 by 8.

Think: How many 8's in 17? 2, and 1 r. Write 2 in the quotient over 7 in 17. Use the remainder 1 for the new number to be divided. It is 19.

Think: How many 8's in 19? 2, and 3 r. Write 2 in the quotient over 9. Use the 3 r in making up the new number to be divided. It is 35.

Think: How many 8's in 35? 4, and 3 r. Write 4 in the quotient over 5. The remainder 3, which is at the end of the division, may be written as $\frac{3}{8}$. You have already learned how to write remainders as fractions.

The quotient is $224\frac{3}{8}$. The average amount earned was $\$224\frac{3}{8}$.

4. Find the quotients in the short way.

$3\overline{)978}$	$4\overline{)537}$	$7\overline{)255}$	$5\overline{)519}$	$9\overline{)637}$
$8\overline{)304}$	$4\overline{)900}$	$6\overline{)596}$	$9\overline{)350}$	$3\overline{)611}$

FINDING OUR WEAK SPOTS

Number your paper the same as the exercises in the test. Copy the examples and find the answers.

1. Combinations in Multiplication

6	8	7	8	5	6	8
9	5	6	7	6	7	9

2. Zeros in Multiplication

232	412	124	400	603
120	300	202	43	221

3. Placing of Partial Products

456	605	206	\$1.75	435
9	8	28	25	256

4. Combinations in Division

$3\overline{)24}$ $8\overline{)56}$ $9\overline{)72}$ $7\overline{)49}$ $6\overline{)54}$ $7\overline{)42}$

5. Remainders in Division

$5\overline{)64}$ $4\overline{)591}$ $6\overline{)391}$ $4\overline{)721}$

6. Zeros in Division

$6\overline{)4806}$ $9\overline{)9720}$ $9\overline{)6300}$ $8\overline{)3204}$

If you made mistakes in any of these exercises, practice the exercise numbered the same on the next page. Then try that part of the test again.

CURING OUR WEAK SPOTS

Copy and write the answers on a folded paper.

1. Combinations in Multiplication

3	8	6	9	8	7	8
8	7	3	6	4	5	9

8	9	7	5	4	8	7
5	3	6	6	7	9	7

2. Zeros in Multiplication

424	361	234	$5.50	202
230	200	202	27	333

3. Placing of Partial Products

186	702	305	$2.45	535
7	6	45	5	137

4. Combinations in Division

$3\overline{)27}$ $9\overline{)63}$ $8\overline{)81}$ $4\overline{)32}$ $9\overline{)36}$ $5\overline{)45}$

5. Remainders in Division

$6\overline{)291}$ $5\overline{)44}$ $9\overline{)364}$ $4\overline{)49}$

$3\overline{)47}$ $4\overline{)583}$ $7\overline{)947}$ $8\overline{)990}$

6. Zeros in Division

$4\overline{)4004}$ $5\overline{)605}$ $7\overline{)7700}$ $3\overline{)5200}$

$7\overline{)3808}$ $6\overline{)2700}$ $9\overline{)1809}$ $8\overline{)4208}$

WINNERS' PAGE
For pupils who made no mistakes on page 62.

PROBLEMS OF EVERYDAY LIFE

Before you can solve a problem, you must know whether to add, subtract, multiply, or divide.

This exercise will help you to solve problems. Read each question and tell what you would do if you had a problem like it. Number your paper from 1 to 4.

If you would add, write A after 1.
If you would subtract, write S.
If you would multiply, write M.
If you would divide, write D.

Do the same after each number on your paper.

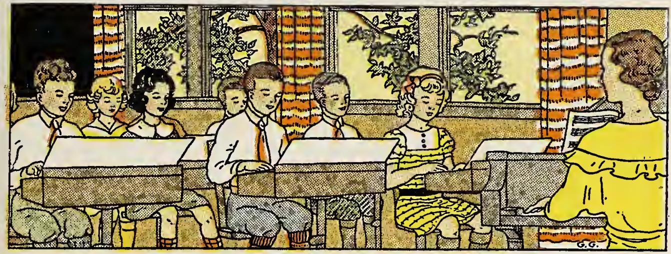
1. If you know how tall you were on your last birthday and how tall you are now, how can you find out how much you have grown since your last birthday?

2. Your mother gives you a five-dollar bill to pay for your new schoolbooks which cost $1.78. How can you tell if you get the right change?

3. If you know how much oranges cost per dozen and you want to buy 2 dozen, how can you find how much the oranges will cost?

4. If you know how much oranges cost per dozen, how can you find how many dozen you can buy for 60 cents?

The Steps in Division



A PIANO CLASS

1. Some schools give piano lessons. In Gray school each piano class has 12 pupils. How many piano classes are there for 144 pupils? $144 \div 12 = ?$

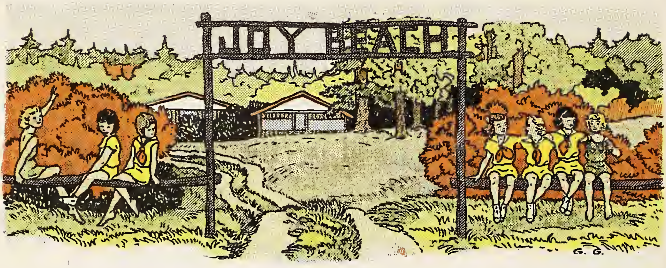
$$\begin{array}{r} 12 \\ 12\overline{)144} \\ \underline{12} \\ 24 \\ \underline{24} \end{array}$$

(1) Divide: How many 12's in 14? Write 1 in the quotient over the first 4.
(2) Multiply: $1 \times 12 = 12$. Write 12 under 14.
(3) Subtract: 12 from $14 = 2$
(4) Bring down 4. The new number to divide is 24.

(1) Divide: How many 12's in 24? Write 2 in the quotient over the second 4.
(2) Multiply: $2 \times 12 = 24$. Write 24 under 24.
(3) Subtract: 24 from $24 = 0$. Do not write 0.

There are 12 classes for 144 pupils.

Remember the steps in division: (1) Divide, (2) Multiply, (3) Subtract, and (4) Bring down.



CAMPING IN THE SUMMER

1. At Joy Beach each group of children stays in camp 14 days. The camp has been open 336 days in the last four years. How many groups of campers can make use of the camp in 336 days? $336 \div 14 = ?$

```
    24
14)336
   28
    56
    56
```

What number do you divide first?
How do you know 2 is the right figure to write in the quotient? $2 \times 14 = ?$ 28 from $33 = ?$
Is the remainder less than the divisor?
How do you get 56 as the new number to be divided?
How do you know 4 is the right figure to put in the quotient this time?
What must you do now to finish?
What does the quotient 24 tell you?

After each subtraction the remainder must be less than the divisor.

2. Divide each number by 12.

156	168	192	216	264	372	228

USING DIVISION IN THINGS WE DO

1. Jack saw the grocer take 276 oranges out of a box and put them into paper bags. He put 1 dozen oranges in each bag. How many bags did the grocer need for the oranges?

2. Saturday at Burt's store 14 boys bought overcoats at the same price. They paid $224 for the 14 coats. What was the price of each coat?

3. Lois read on a sign at a filling station, "6 gallons gasoline for $1." At this price, what was the cost of the 138 gallons of gasoline bought for the family car last month?

4. Our school will need 384 tablets for the pupils next month. There are 12 tablets in a package. How many packages should the school get?

5. Jane drew a book from the library that must be returned in 14 days. The book has 434 pages. How many pages of reading should Jane average a day if she returns the book in time?

6. Every week Anne puts 12 cents of her allowance in her bank. In how many weeks will she have 192 cents in her bank?

7. Find the quotients in these examples.

$14\overline{)308}$ $11\overline{)297}$ $7\overline{)154}$ $8\overline{)144}$ $12\overline{)288}$ $9\overline{)198}$

8. James wants to take a trip that costs $2.85. If he saves 15 cents a week, how many weeks will it take him to save enough money to make the trip?

HATCHING EGGS IN AN INCUBATOR

On many large poultry farms incubators are now used for hatching eggs.

1. Bob's uncle has set 195 eggs in an incubator. How many hens would be needed to set 195 eggs if 13 eggs were given to each hen? $195 \div 13 = ?$

$$\begin{array}{r} 15 \\ 13\overline{)195} \\ \underline{13} \\ 65 \\ \underline{65} \end{array}$$

(1) Divide: How many 13's in 19? 1. Write 1 in the quotient over the 9.

(2) Multiply: $1 \times 13 = 13$. Write 13 under 19.

(3) Subtract: 13 from $19 = 6$. The remainder 6 is about half as large as the divisor 13. If the remainder is about half as large as the divisor, the next figure in the quotient is 5, or about 5.

(4) Bring down the 5 of the dividend.

(1) Divide: How many 13's in 65? 5. Write 5 in the quotient over 5 of 195.

(2) Multiply: $5 \times 13 = 65$

(3) Subtract: 65 from $65 = 0$

The quotient is 15.

15 hens would be needed.

If the remainder is about half as large as the divisor, the next quotient figure will be 5, or about 5.

MAKING NEST BOXES

1. Ted will make 21 nest boxes of the same size for the henhouse. The space for the boxes is 357 inches long. How long should each box be? $357 \div 21 = ?$

```
     17
21)357
    21
    --
    147
    ---
    ---
```

(1) Divide: How many 21's in 35? 1. Write 1 in the quotient over 5.

(2) Multiply: $1 \times 21 = 21$. Write 21 under 35.

(3) Subtract: 21 from $35 = 14$. 14 is more than half as large as 21.

So the next quotient figure is more than 5.

(4) Bring down 7.

(1) Divide: How many 21's in 147, or how many 2's in 14? 7. Write 7 in the quotient over 7.

Finish the problem yourself.

Each box should be 17 inches long.

2. One day equals 24 hours. How many days are the same as 336 hours? $336 \div 24 = ?$

```
     14
24)336
    24
    --
     9-
     --
     --
```

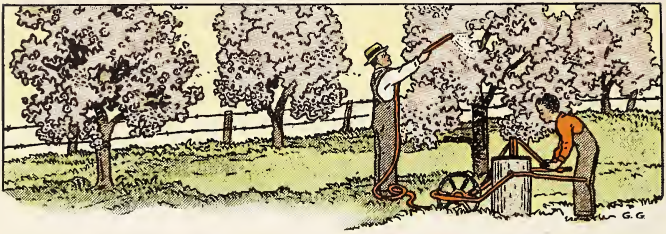
(1) Divide: How many 24's in 33? Where should you write 1 in the quotient?

(2) Multiply: $1 \times 24 = 24$

(3) Subtract: 24 from $33 = 9$. 9 is less than half as large as 24, so the next quotient figure is less than 5.

(4) Bring down 6.

Do the rest yourself. Divide, multiply, and subtract, as you have been doing.



SPRAYING THE APPLE ORCHARD

1. Last summer Joe worked in an apple orchard. The orchard has 696 trees with 24 trees in each row. How many rows of trees are in the orchard? $696 \div 24 = ?$

Divide

$$\begin{array}{r} 29 \\ 24\overline{)696} \\ \underline{48} \\ 21\text{–} \\ \text{– – –} \\ \hline \end{array}$$

Check

$$\begin{array}{r} 29 \\ \underline{24} \\ 116 \\ \text{– –} \\ \hline \text{– – –} \end{array}$$

(1) Divide: How many 24's in 69? 2. Write 2 in the quotient over 9.

(2) Multiply: $2 \times 24 = 48$

(3) Subtract: 48 from $69 = 21$. This remainder 21 is **almost as large** as the divisor. For the next figure in the quotient try 9, the largest one-figure number.

(4) Bring down 6.

Do the rest yourself.

Was 9 the correct figure to use?

Check the answer.

How many rows are in the orchard?

2. How many trees should Joe and his father spray each day in order to spray the apple orchard each week? Count six working days to a week.

A TRICK THAT HELPS

1. Miss Brown has 129 sheets of drawing paper for our class this morning. There are 43 pupils in the class. If the paper is divided equally, how many sheets can each child have? $129 \div 43 = ?$

When the divisor has more than one figure, **try to think what the quotient is.** This is called **estimating the quotient.**

To find how many 43's there are in 129, think how many 4's are in 12.

$$\begin{array}{r} 3 \\ 43\overline{)129} \\ \underline{129} \end{array}$$

(1) Divide: How many 4's in 12? 3. Write 3 in the quotient above 9, the last dividend figure you used.
(2) Multiply: $3 \times 43 = 129$. Write 129 under 129.
(3) Subtract: 129 from $129 = 0$

The quotient is 3.
Each child can have 3 sheets of paper.

When the second figure of the divisor is less than 5, estimate the quotient. Do this by dividing the first one or two figures of the dividend by the first figure of the divisor.

Divide and check. Estimate your quotient, just as you did above.

2.	$61\overline{)549}$	$53\overline{)208}$	$23\overline{)69}$	$71\overline{)639}$
3.	$34\overline{)136}$	$62\overline{)434}$	$84\overline{)588}$	$93\overline{)837}$
4.	$32\overline{)224}$	$42\overline{)210}$	$63\overline{)567}$	$81\overline{)243}$
5.	$74\overline{)444}$	$53\overline{)318}$	$74\overline{)370}$	$64\overline{)512}$
6.	$82\overline{)328}$	$31\overline{)62}$	$51\overline{)255}$	$82\overline{)656}$

ANOTHER TRICK TO LEARN

1. The children brought 154 jars of fruit to school to give equally to 29 families on Thanksgiving. How many jars should each family get?

If the last figure of the divisor is 7, 8, or 9, you must think carefully to find the quotient.

Look in the boxes below and see how Sue and Frank tried to divide 154 by 29.

$$\begin{array}{r} 6 \\ 29\overline{)154} \\ \underline{174} \end{array}$$

Sue thought 6 was the quotient. She multiplied: $6 \times 29 = 174$. She couldn't take 174 from 154. So the quotient 6 was too large.

$$\begin{array}{r} 4 \\ 29\overline{)154} \\ \underline{116} \\ 36 \text{ r} \end{array}$$

Frank thought 4 was the quotient. He subtracted: 116 from $154 = 36$. The remainder is larger than the divisor. So 4 is too small.

$$\begin{array}{r} 5 \\ 29\overline{)154} \\ \underline{145} \\ 9 \text{ r} \end{array}$$

The class thought: 29 is almost 30. How many 3's in 15? 5. When they used 5, the product was less than 154 and the remainder was less than the divisor.

So 5 is correct.

Each family should get 5 jars of fruit. There will be 9 jars left.

> **This rule will often help you to find the first quotient figures when the second figure of your divisor is 7, 8, or 9: Estimate the quotient figure by dividing the first one or two figures of the dividend by 1 more than the first figure of the divisor.**

HOW BOYS AND GIRLS USE DIVISION

1. A fourth grade class divided 720 colored papers for making posters. They divided the papers equally among the 32 children in the class.
   (a) How many sheets were given to each child?
   (b) How many sheets were left?

2. There are 22 children in grade 5. In one month they read 3190 pages in library books. What was the average number of pages each child read?

3. The bus fare for 42 children on a school picnic was \$6.30. How much was the bus fare for each child if all paid the same?

4. There were 21 boys in a Boy Scout troop. They shared equally in buying a camping outfit for \$29.40. How much was each boy's share?

5. In sewing the pieces for her quilt, Jane is using 12 pieces in each block. How many blocks for the quilt can she make with 576 pieces?

6. Mr. Fisher's car averages 16 miles on each gallon of gasoline. How many gallons of gasoline will be needed in driving 464 miles in the car?

7. Find the quotients and remainders. Check.

(a)	$21\overline{)128}$	$41\overline{)176}$	$62\overline{)744}$	$38\overline{)159}$
(b)	$52\overline{)167}$	$81\overline{)904}$	$92\overline{)216}$	$73\overline{)234}$

8. Things to remember in division:
   (a) When you multiply, the product must not be larger than the dividend.
   (b) After you subtract, the remainder must be smaller than the divisor.

KEEPING UP IN WHAT YOU HAVE LEARNED

1. Add and check:

28	314	2
13	107	43
64	989	7
9	243	419
40	798	88

2. Subtract and check:

845	900	312
456	81	244

347	199	107
77	140	8

3. Multiply each number by 8 and add 3 to the product. (Begin in this way, 48 and 3 are 51.)

6 2 0 8 3 5 9 7 1 4

4. Multiply each number by 4, and tell whether you can subtract the product from 29.

6 7 5 9 2 0 4 8 1 3

5. Read these examples and say the quotients.

$42 \div 7 = ?$	$32 \div 4 = ?$	$48 \div 8 = ?$	$63 \div 9 = ?$	$35 \div 5 = ?$
$27 \div 9 = ?$	$24 \div 3 = ?$	$36 \div 4 = ?$	$45 \div 5 = ?$	$54 \div 6 = ?$
$18 \div 3 = ?$	$24 \div 6 = ?$	$28 \div 7 = ?$	$36 \div 6 = ?$	$56 \div 7 = ?$

6. How many 8's are in each of these numbers?

16 40 24 56 64 32 48 72 8

7. Find the quotients in these examples.

$13\overline{)221}$ $14\overline{)322}$ $12\overline{)324}$ $13\overline{)234}$ $12\overline{)336}$

8. In solving problems, for what do we use

(a) Addition?
(b) Subtraction?
(c) Multiplication?
(d) Division?

BILLY AND HIS FATHER'S STORE

1. Last month Billy's father ordered suits for the spring trade. He paid $1071 for 51 suits of one kind. What was the price of each suit? $\$1071 \div 51 = ?$

```
      $  2–
51)$1071
     102
     ———
      51
      ——
      ——
```

(1) Divide: How many 5's in 10? 2. Write 2 in the quotient above the 7. Why above 7?
(2) Multiply: $2 \times 51 = 102$. Write 102 under 107.
(3) Subtract: 102 from $107 = 5$
(4) Bring down 1 and finish the example.

The quotient is $21.
The price of each suit was $21.

Remember: Write each quotient figure over the last figure used in the dividend.

2. Billy's father paid $1160 for 40 higher-priced suits. What did each of these higher-priced suits cost Billy's father?

A POINT TO REMEMBER

In division be sure you bring down all the dividend figures in their order. Remember to bring down the last figure.

1. Carl's father has a large nursery. He sells young trees in bundles of 6 trees each. One month he sold 5460 of the trees. How many bundles did he sell in that month? $5460 \div 6 = ?$

Say the words to fill the blanks.

Divide

```
   ---
6)5460
  54
   6
   6
    0
```

Check

```
  ---
    6
 5460
```

(1) Divide: How many 6's in 54? Where will you write the __? Why?

(2) Multiply: __ $\times 6 = 54$

(3) Subtract: 54 from $54 = ?$

(4) Bring down __.

(1) Divide: How many 6's in __? Write __ in the quotient over __.

(2) Multiply: __ $\times 6 = 6$

(3) Subtract: 6 from $6 = 0$

(4) Bring down the last figure in the dividend.

Finish the division yourself.

How many bundles did Carl's father sell?

Now check your answer by finding the product of the quotient and the divisor. Does this give you the same number as the dividend?

The division is not finished until all dividend figures have been brought down.

1. One year 25 members of the fire department in Geneva were given a bonus (extra money) of \$1826 for preventing fires during the year. How much of the money should each man receive if the bonus was divided equally? $\$1826 \div 25 = ?$

$$\begin{array}{r} \$\ 73\tfrac{1}{25} \\ 25\overline{)\$1826} \\ \underline{175} \\ 76 \\ \underline{75} \\ 1 \end{array} \qquad \begin{array}{r} \$\ 73 \\ 25\overline{)\$1826} \\ \underline{175} \\ 76 \\ \underline{75} \\ 1\ r \end{array}$$

Here you have a remainder. Write the quotient $\$73\frac{1}{25}$ or mark the remainder r.

The remainder is usually written as a fraction, except in the case of things, which cannot be divided into parts.

$$\begin{array}{rl} 25 & \text{Divisor} \\ \underline{73} & \text{Quotient} \\ 75 & \\ \underline{175} & \\ 1825 & \\ \underline{1} & \text{Remainder} \\ 1826 & \text{Dividend} \end{array}$$

Check the above example in this way:

Multiply the divisor by the quotient and add the remainder to the product.

2. Divide and check:

$75\overline{)4686}$ $\qquad 1426 \div 82 = ?$

$63\overline{)1550}$ $\qquad 525 \div 35 = ?$

In each problem tell whether you should multiply or divide. Then do it.

1. Five boys are going together on a trip on the train. They paid $1.70 each for their tickets. How much did all the 5 tickets cost?

2. John's father has a strawberry patch with 13 rows of plants. There are 248 plants in each row. How many strawberry plants are in the patch?

3. Ned bought 7 calves for $84. What was the average cost of a calf?

4. New furniture for our schoolroom would cost $175. How much would the furniture cost for 9 rooms, if the cost is the same for each room?

5. Healy's Store paid $8.75 for 25 girls' purses of one kind. How much was that for each purse?

6. In one large office building with 18 floors there are 1008 people working. What is the average number of people working on each floor?

7. Our Sunday school saved $6.75 to buy Christmas books. How many books can it buy if the average cost of each book is $.25? $6.75 = 675¢

THINGS YOU DO WHEN YOU DIVIDE

In division you often multiply and add. Have a timekeeper tell you how quickly you can multiply and add in these exercises.

1.	$5\times 2+4=?$	$7\times 4+5=?$	$9\times 7+6=?$
2.	$4\times 5+3=?$	$7\times 7+3=?$	$3\times 9+2=?$
3.	$7\times 4+2=?$	$8\times 6+7=?$	$6\times 7+3=?$
4.	$6\times 6+4=?$	$3\times 9+6=?$	$8\times 7+9=?$
5.	$9\times 3+5=?$	$5\times 9+7=?$	$8\times 8+6=?$
6.	$9\times 5+6=?$	$6\times 5+3=?$	$9\times 9+7=?$

Copy and fill the blanks. When there is no remainder, write 0 on the blank before r.

7.	22 = __ 11's __ r	88 = __ 22's __ r
8.	31 = __ 10's __ r	67 = __ 33's __ r
9.	36 = __ 12's __ r	46 = __ 21's __ r
10.	45 = __ 7's __ r	29 = __ 25's __ r
11.	48 = __ 12's __ r	95 = __ 41's __ r

USING THE HELPS IN DIVISION

Find the quotients and watch for remainders. Mark each remainder as a fraction. Check.

12.	$24\overline{)48}$	$23\overline{)69}$	$12\overline{)61}$	$41\overline{)89}$	$34\overline{)75}$
13.	$28\overline{)56}$	$27\overline{)54}$	$23\overline{)51}$	$36\overline{)74}$	$65\overline{)84}$
14.	$40\overline{)360}$	$24\overline{)268}$	$32\overline{)640}$	$13\overline{)407}$	$21\overline{)907}$
15.	$99\overline{)4884}$	$29\overline{)3277}$	$31\overline{)6861}$	$28\overline{)5908}$	$53\overline{)6996}$
16.	$62\overline{)1426}$	$38\overline{)4477}$	$72\overline{)2304}$	$83\overline{)9960}$	$68\overline{)1632}$

MEETING PROBLEMS OF SEVERAL KINDS

In some of the problems below you need to divide, in others you need to add or subtract or multiply. In each problem ask yourself these questions:

(a) What am I to find?
(b) What is given to find it?
(c) What shall I do with the numbers I have?

1. Joe has saved 75¢ to spend for basket ball games this year. Children pay only 15¢ for a ticket. How many games can Joe see for the money he has saved?

In this problem your answers to the questions will be:

(a) The number of games Joe can see.
(b) The money Joe has (75¢) and the cost (15¢) of a ticket.
(c) Divide 75 by 15, because Joe can buy as many tickets as there are 15's in 75.

2. Alice's mother baked 36 cookies to send to the school party. She wants to pack them in a box that holds 9 cookies in each layer. How many layers will the box need to hold?

3. Father bought 15 gallons of gas this morning for his car. He had to pay 17¢ a gallon for it. How much did he pay for all of it?

4. Dick's father plans to trade his old car toward a new one. The dealer will allow him $435 in trade. The new car will cost $1300. How much money will Dick's father need to pay after he turns in the old car?

5. Gordon's grandfather had 43 sugar maple trees on his farm in Vermont. This spring he got 473 gallons of sap from the trees. Gordon wanted to know how many gallons of sap from each tree this would be if all the trees gave the same amount. He wanted the average. What was the average amount of sap from each tree?

6. Gordon says that his grandfather uses about 34 quarts of sap for every quart of syrup he makes. How many quarts of syrup should he get from 1666 quarts of sap?

7. When Wilbur and Orville Wright first flew their airplane in 1903, it stayed off the ground less than a minute. Lindbergh flew from the United States to Paris 24 years later, staying in the air $33\frac{1}{2}$ hours. In what year did Lindbergh fly to Paris?

8. In 1915 the longest distance that people could talk over a telephone was from Boston to San Francisco, 2650 miles. In 1930 one could telephone from London to San Francisco, a distance of 7491 miles. How much farther could one telephone in 1930 than in 1915?

1. Read each example. In these examples, what number is the divisor? How is the quotient different from the dividend?

$\begin{array}{r} 3 \\ 10\overline{)30} \end{array}$	$\begin{array}{r} 5 \\ 10\overline{)50} \end{array}$	$\begin{array}{r} 16 \\ 10\overline{)160} \end{array}$	$\begin{array}{r} 37 \\ 10\overline{)370} \end{array}$	$\begin{array}{r} 80 \\ 10\overline{)800} \end{array}$

> **To divide a number ending in 0 by 10, cross out the right-hand 0 of the number.**

2. Divide each number by 10 by the short way:

70	250	40	820	250	730
120	90	980	300	460	500

Check your answers by multiplying.

3. Without using a pencil, divide each of these numbers by 10:

650	360	220	170	430	720
400	540	900	510	800	150

4. Find the quotients. Check.

$10\overline{)2790}$	$8\overline{)4568}$	$5\overline{)3045}$	$9\overline{)2709}$	$10\overline{)6650}$

5. Find the quotients. Mark each remainder r. Check.

$5\overline{)413}$	$10\overline{)790}$	$9\overline{)8759}$	$7\overline{)1223}$	$10\overline{)5480}$
$8\overline{)679}$	$10\overline{)2050}$	$3\overline{)865}$	$9\overline{)151}$	$4\overline{)1383}$
$5\overline{)742}$	$6\overline{)728}$	$8\overline{)5925}$	$9\overline{)4607}$	$10\overline{)1470}$

LEARNING A SHORT WAY

1. Mr. Nelson set out 60 new tulip bulbs. He put 20 bulbs in a row. How many rows did he make? $60 \div 20 = ?$

$$\begin{array}{r} 3 \\ 20\overline{)60} \\ \underline{60} \end{array}$$

(1) Divide: How many 20's in 60? 3. Write 3 over 0 of 60.
(2) Multiply: $3 \times 20 = 60$
(3) Subtract: 60 from $60 = 0$
Mr. Nelson set out 3 rows of bulbs.

2. Without using a pencil, say the quotients.

$20\overline{)40}$ $30\overline{)90}$ $30\overline{)60}$ $10\overline{)30}$ $20\overline{)80}$ $10\overline{)50}$

3. Mr. Nelson had 163 old bulbs to plant. He put 20 in a row. How many rows did he set out? $163 \div 20 = ?$ How many bulbs were left over?

$$\begin{array}{r} 8 \\ 20\overline{)163} \\ \underline{160} \\ 3\ \text{r} \end{array}$$

(1) Divide: How many 20's in 163? 8. Write 8 in the quotient over 3 of 163.
(2) Multiply: $8 \times 20 = 160$
(3) Subtract: 160 from $163 = 3$
Mr. Nelson set out 8 rows of 20 bulbs each. He had 3 bulbs left over.

4. Without using a pencil, give the quotients. Say the remainders if there are any.

$20\overline{)80}$ $30\overline{)94}$ $60\overline{)67}$ $30\overline{)125}$ $50\overline{)75}$ $40\overline{)96}$

$20\overline{)67}$ $30\overline{)150}$ $20\overline{)45}$ $60\overline{)240}$ $60\overline{)184}$ $50\overline{)300}$

LEARNING A SHORT WAY

1. Say the steps in each of these examples.

$\begin{array}{r} 3 \\ 20\overline{)60} \end{array}$ $\quad$ $\begin{array}{r} 2 \\ 40\overline{)80} \end{array}$ $\quad$ $\begin{array}{r} 9 \\ 30\overline{)270} \end{array}$ $\quad$ $\begin{array}{r} 8 \\ 60\overline{)480} \end{array}$ $\quad$ $\begin{array}{r} 7 \\ 50\overline{)350} \end{array}$

What is the right-hand figure in each divisor? What is the right-hand figure in each dividend?

Would the quotient be changed in any example above if the 0 were cut off in each divisor and each dividend? Is it changed in the example below?

$$\begin{array}{r} 3 \\ 2\cancel{0}\overline{)6\cancel{0}} \end{array}$$

2. Say each of the above examples like this: $60 \div 20 = 6 \div 2$.

3. Use the new way to divide in these examples. Check your work by multiplying.

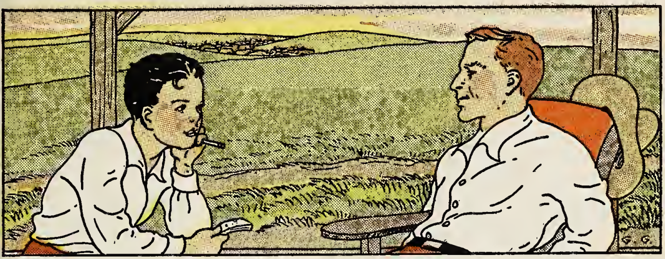
$90\overline{)450}$ $\quad$ $80\overline{)320}$ $\quad$ $70\overline{)630}$ $\quad$ $20\overline{)240}$ $\quad$ $60\overline{)360}$

$30\overline{)180}$ $\quad$ $50\overline{)400}$ $\quad$ $40\overline{)800}$ $\quad$ $90\overline{)810}$ $\quad$ $70\overline{)420}$

4. See if you can do these examples as fast as you can read.

$9 \times 9 + 4 =$	$7 \times 8 + 2 =$	$9 \times 6 + 4 =$
$3 \times 7 + 6 =$	$9 \times 7 + 5 =$	$5 \times 9 + 2 =$
$8 \times 4 + 5 =$	$6 \times 6 + 4 =$	$7 \times 6 + 3 =$
$5 \times 6 + 3 =$	$8 \times 5 + 7 =$	$4 \times 7 + 5 =$

When divisor and dividend both end in 0, cross off one 0 from each number. Then divide. This does not change the quotient.



UNCLE BOB'S CATTLE

1. Last summer Tom saw his Uncle Bob's herd of 3672 beef cattle on the range. Tom said, "Uncle Bob, how many stock cars would it take to hold all these cattle, if 36 make a carload?"

How many would it take? $3672 \div 36 = ?$

```
   10-
36)3672
   36
   --
    72
    --
    --
```

(1) Divide: How many 36's in 36? 1. Write 1 in the quotient over 6.
(2) Multiply: $1 \times 36 = 36$
(3) Subtract: 36 from $36 = 0$
(4) Bring down 7.
(1) Divide: How many 36's in 7? None. Write 0 in the quotient over 7.

Bring down 2 and finish the example. It would take __ cars to hold the cattle.

> **When the divisor is larger than the number to be divided, write 0 in the quotient.**

Divide and check.

2.	43)8858	63)38115	54)5886	73)51246
3.	84)42336	32)25696	97)19788	59)29618

DO YOU THINK THESE ARE HARD?

1. Marie paid $2.70 for 18 Japanese lanterns for her lawn party. How much did each lantern cost? $2.70 ÷ 18 = ?

```
     $ .1 5
1 8)$2.7 0
     1 8
     ---
       9 0
       9 0
       ---
```

Put $ over $ and decimal point over decimal point.

Divide as you would with any numbers.

Look at the example in the box and say each step in the division.

Read the answer, "15 cents."

Each lantern cost 15 cents.

2. Jean's mother sent her nieces 8 dolls. The dolls were all alike. They cost $6. How much did each doll cost? $6 ÷ 8 = ?

```
   $ .7 5
8)$6.0 0
    - -
    ---
      - -
      - -
      ---
```

Sometimes the dividend is a number of dollars and no cents. Write it with a $ and a decimal point and put on two zeros for cents.

Copy the example on your paper and finish it.

How much did each doll cost?

3. Four boys paid $9 for a bobsled for coasting. What was each boy's share of the cost of the sled?

4. Eight girls shared the expense of a picnic trip which cost $18.00. What amount should each girl pay?

5. Mary and 3 of her friends went to a picture show. The total cost including street car fare was $1.28. What should each girl pay?

GET THESE RIGHT THE FIRST TIME

1. The Royal put in stock 25 boys' school suits all of one kind. These suits cost the store \$310. How much did each suit cost the store? $\$310 \div 25 = ?$

$$\begin{array}{r} \$\ 12.40 \\ 25\overline{)\$310.00} \\ 25 \\ \hline 60 \\ 50 \\ \hline 100 \\ 100 \\ \hline 0 \end{array}$$

The dividend is a number of dollars. How should you show cents' place?
What two things should you put in quotient's place before you divide?
How many 25's in 31? 1. Where should we write the 1? Why?
How many 25's in 60?
How many 25's in 100?
How do we get the zero at the bottom?
Why do we put a zero after the 4 in the quotient?

How much did each suit cost the store? Check the answer.

2. How many one-pound bottles will be needed to hold 3440 ounces of olive oil? (16 ounces = 1 pound.)

Find the quotients in these examples. Check.

3. $12\overline{)180}$ $14\overline{)182}$ $13\overline{)156}$ $16\overline{)496}$ $14\overline{)224}$

4. $13\overline{)169}$ $16\overline{)672}$ $12\overline{)276}$ $7\overline{)336}$ $13\overline{)182}$

5. $16\overline{)832}$ $7\overline{)238}$ $16\overline{)976}$ $6\overline{)288}$ $12\overline{)312}$

6. $19\overline{)\$2.28}$ $25\overline{)\$525.00}$ $23\overline{)\$34.50}$ $17\overline{)\$23.80}$

BUYING THEIR TENT

Read each problem and tell what you would do to solve it. Ask yourself:

(a) What is wanted?
(b) What is given?
(c) What is to be done?

After you and your teacher have talked about the problems, solve them.

1. Walter, Nell, and Jane want a junior tent that costs $7.97. Their father will give them $5 to help buy one. How much more money will they need if they buy the tent?

2. You have found how much more money Walter, Nell, and Jane need to pay for the tent. How much will each need to pay, if all pay equally?

3. Jay's mother is buying some new things for her living room. The rug she has chosen will cost $128, a chair is priced at $27, and new drapes will cost $67. If she buys all these things, how much money will she need?

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 18 minutes. Your score will be the number of problems you solve correctly.

	Scale	Score
A	Excellent	= 7 or 6
B	Good	= 5
C	Fair	= 4 or 3
D	Poor	= 2 to 0

1. The 226 girls in Park school plan to march in rows of 7 in the parade. How many rows will they make? How many girls will be left over?

2. When Ned hunted the eggs today, he got 54. He put the eggs in boxes each holding 1 dozen eggs. How many of these boxes did he fill? How many eggs did he have toward filling one more box?

3. Fire prevention records show that in 5 years campers started 20,240 fires, while lightning started 15,000 fires. How many more fires were caused by campers than by lightning in that period?

4. Jack's basket ball suit will cost \$2.40. How much must he earn each week in order to pay for the suit within 4 weeks?

5. Mr. Hoffman says he would not sell his 600-acre farm for less than \$120,000. At what price per acre does he value the farm?

6. The grocer will charge \$6.75 to fill the order of our club of 25 girls for a Thanksgiving basket to send to a family. If we divide the expense equally, how much should each girl pay?

7. One hundred years ago there were 8450 post offices in the United States. There are now about 50,000. What has been the increase in 100 years?

SOME PEOPLE THINK THESE ARE HARD

1. Fred's father bought 78 chickens to add to his flock. They cost him \$38.22. What was the average price paid for a chicken? $\$38.22 \div 78 = ?$

$$\begin{array}{r} \$\quad .5 \\ 78\overline{)\$38.22} \\ \underline{390} \end{array}$$

(1) Divide: How many 78's in 382? The answer seems to be 5, for $5 \times 7 = 35$. Write 5 in the quotient.

(2) Multiply: $5 \times 78 = 390$

(3) Subtract: 390 from $382 = ?$ You cannot subtract.

Begin again.

$$\begin{array}{r} \$\quad .4 \\ 78\overline{)\$38.22} \\ \underline{312} \\ 702 \end{array}$$

Think: 7 in the divisor and 1 more are 8.

(1) Divide: How many 8's in 38? 4. Write 4 in the quotient.

(2) Multiply: $4 \times 78 = 312$

(3) Subtract: 312 from $382 = 70$. 4 is right.

Bring down 2 and finish.

Fred's father paid an average price of \$.49.

2. Mr. Allen found that he went 1552 miles on his trip. He used 97 gallons of gasoline. How many miles did he average on a gallon of gasoline?

3. There are 330 pupils who wish to eat in the school lunchroom. The room can take 87 pupils at a time. How many times will the room be filled during one lunch period, and how many pupils will be left for another roomful? $330 \div 87 = ?$

The best method of finding the quotient figures, after the first quotient figure, is by watching the relation of the remainder to the divisor.

> **If the remainder is about half of the divisor, the quotient figure will be 5 or about 5. If the remainder is much less than half of the divisor, the quotient figure will be less than 5. If the remainder is almost as large as the divisor, the quotient figure will be 9 or almost 9.**

1. In February in a leap year, Mr. Clark's bills for family expenses amounted to \$97.15. What was the average expense each day that month? $\$97.15 \div 29 = ?$

```
      $ 3.3 5
2 9)$9 7.1 5
     8 7
     1 0 1
       8 7
       1 4 5
       1 4 5
```

Divide \$97.15 by 29.

Write the \$ and the decimal point in the quotient.

Find the first quotient figure as you have been doing. How many 3's in 9? Write 3 in the quotient over 7.

Now find the other quotient figures by the rule above.

Multiply: $3 \times 29 = 87$. Subtract: 87 from $97 = 10$. This remainder is less than half of 29. The quotient figure will be small. Bring down 1 and divide. Try 3 in the quotient.

Multiply and subtract again. The new remainder is 14. It is about half of 29. The next quotient figure will be 5. Bring down 5 from the dividend and finish.

Mr. Clark's average daily expense was \$3.35.

WHAT IS WRONG HERE?

1. In a test a fifth grade boy divided 186 by 23 in this way.

$$\begin{array}{r} 7 \\ 23\overline{)186} \\ \underline{161} \\ 25 \\ \underline{23} \\ 2 \end{array}$$

← Here is his trouble.
The remainder (25) is larger than the divisor (23).
This means that there is another 23 in 186.

$$\begin{array}{r} 8 \\ 23\overline{)186} \\ \underline{184} \\ 2 \end{array}$$

Now try 8 in the quotient instead of 7.
← This remainder is not too large.
The quotient is 8 and 2 remainder.

> **If a remainder is as large as the divisor, or larger, the quotient figure is too small.**

Divide and check. Make sure the quotient is neither too large nor too small.

2. $89\overline{)6052}$ $\quad 28\overline{)1008}$ $\quad 93\overline{)4557}$

3. $46\overline{)3910}$ $\quad 27\overline{)1053}$ $\quad 35\overline{)2555}$

4. $4180 \div 55 = ?$ $\quad 3008 \div 64 = ?$ $\quad 2470 \div 65 = ?$

5. $1885 \div 29 = ?$ $\quad 2208 \div 48 = ?$ $\quad 4928 \div 88 = ?$

6. Divide 4704 by 56. Divide 1786 by 47.

7. Divide 2100 by 75. Divide 3819 by 67.

1. See if you can tell what is the quotient in each of these examples. Then copy the examples and divide, and see if your answers are right.

69)174	48)355	77)396	59)277	85)523

2. Without using a pencil see if you can tell what the quotients and remainders are.

20)180	50)355	21)634	33)100	51)109
40)130	12)240	16)325	44)890	60)362
90)820	31)932	45)100	32)128	90)275

3. Copy these examples, a row at a time. Then find the quotients. See if you can find the correct quotients for all the examples in 10 minutes, not counting your time in copying.

9)2769	5)$45.35	8)2004	6)1724
8)5969	7)4205	9)6842	4)$32.08
30)1470	90)1897	20)2162	50)1677
60)5463	20)$148.70	80)4083	40)3645

4. Copy and divide. You should be able to find the quotients correctly in 12 minutes.

41)1658	32)$13.45	22)17909	61)12935
52)15784	81)1956	42)$89.76	71)22763
96)10556	68)$69.55	87)16505	28)$56.84

Each exercise on this page makes you use a different division habit. You should be able to find the quotients in all the examples quickly and correctly. Check all your answers.

1.	$4\overline{)848}$	$2\overline{)624}$	$3\overline{)396}$	$7\overline{)777}$	$3\overline{)936}$
2.	$3\overline{)129}$	$4\overline{)128}$	$2\overline{)168}$	$3\overline{)243}$	$4\overline{)364}$
3.	$2\overline{)289}$	$4\overline{)846}$	$5\overline{)559}$	$3\overline{)965}$	$6\overline{)187}$
	$5\overline{)158}$	$2\overline{)645}$	$6\overline{)248}$	$4\overline{)367}$	$8\overline{)489}$
4.	$5\overline{)125}$	$3\overline{)372}$	$4\overline{)606}$	$2\overline{)356}$	$6\overline{)276}$
	$4\overline{)176}$	$7\overline{)371}$	$9\overline{)207}$	$3\overline{)534}$	$5\overline{)285}$
5.	$3\overline{)105}$	$8\overline{)408}$	$2\overline{)308}$	$4\overline{)608}$	$7\overline{)203}$
	$5\overline{)205}$	$6\overline{)306}$	$9\overline{)909}$	$4\overline{)708}$	$3\overline{)108}$
6.	$5\overline{)525}$	$4\overline{)836}$	$6\overline{)654}$	$2\overline{)300}$	$9\overline{)180}$
	$3\overline{)612}$	$7\overline{)749}$	$4\overline{)832}$	$6\overline{)900}$	$5\overline{)505}$
7.	$4\overline{)807}$	$6\overline{)185}$	$3\overline{)607}$	$8\overline{)723}$	$2\overline{)415}$
	$5\overline{)254}$	$7\overline{)213}$	$5\overline{)510}$	$9\overline{)636}$	$6\overline{)614}$
8.	$12\overline{)396}$	$21\overline{)6364}$	$15\overline{)6510}$	$24\overline{)4920}$	$32\overline{)6728}$
9.	$26\overline{)1044}$	$18\overline{)7236}$	$69\overline{)2208}$	$47\overline{)1418}$	$19\overline{)1350}$
10.	$10\overline{)650}$	$10\overline{)200}$	$20\overline{)240}$	$50\overline{)350}$	$40\overline{)1000}$

THINGS YOU HAVE LEARNED

Have a timekeeper see how long it takes you to get the answers to these examples and questions.

1. Find the difference between 8074 and 3659.

2. Add	**3.** Add	**4.** Add
47	$875.25	359
65	98.85	784
93	405.09	607
66	325.00	896
78	10.38	

5. Find the average of 294, 178, 397, 207.

6. Multiply
6748
67

7. Subtract
$45.00
19.75

8. $57\overline{)14079}$

9. $7 \times \$18.75 =$

10. $97 \times 783 =$

11. $79\overline{)44793}$

12. Subtract
$125.50
78.45

13. $68 \times 9463 =$

14. How much more is $329.35 than $158.25?

15. Find the product of 7648 and 708.

16. How many hours from 6:30 P.M. to 2:00 A.M.?

17. How many inches in 12 feet?

18. Olympia Fields Golf Course No. 4 is 6474 yards long. How many feet long is the course?

19. When you know the cost of one thing, how can you find the cost of 12 things of the same kind?

FINDING OUR WEAK SPOTS

Find the quotients in these examples. Work as fast as you can work without making mistakes.

1. Easy Quotients

$21\overline{)756}$	$32\overline{)544}$	$41\overline{)943}$	$52\overline{)887}$	$48\overline{)768}$

$82\overline{)4428}$	$62\overline{)1116}$	$32\overline{)3774}$	$16\overline{)8656}$

2. Finding First Quotient Figure

$17\overline{)1156}$	$19\overline{)1102}$	$16\overline{)7264}$	$57\overline{)2451}$
$84\overline{)2184}$	$47\overline{)1633}$	$39\overline{)1638}$	$29\overline{)1972}$

3. Zero in Dividend or Quotient

$34\overline{)3604}$	$25\overline{)4761}$	$44\overline{)8932}$	$87\overline{)4366}$
$45\overline{)5400}$	$28\overline{)5740}$	$80\overline{)6000}$	$60\overline{)2580}$

4. Divisors Ending in 7, 8, or 9

$29\overline{)1228}$	$57\overline{)1958}$	$78\overline{)4930}$	$67\overline{)3551}$
$47\overline{)1799}$	$69\overline{)3255}$	$88\overline{)2125}$	$59\overline{)2539}$
$89\overline{)2418}$	$68\overline{)6082}$	$37\overline{)2997}$	$19\overline{)8550}$
$38\overline{)2660}$	$29\overline{)8076}$	$57\overline{)3704}$	$18\overline{)6503}$

Check your work as your teacher reads the right answers. If you made mistakes in any of these exercises, take the exercise of the same number on pages 97, 98, or 99. If you made no mistakes, skip pages 97, 98, and 99.

CURING OUR WEAK SPOTS

1. Easy Quotients

Write the products on a folded paper. How many of these products can you subtract from 379?

$6\times48=$	$7\times63=$	$9\times27=$	$3\times76=$
$5\times54=$	$4\times85=$	$8\times16=$	$5\times49=$
$9\times43=$	$3\times98=$	$5\times66=$	$7\times94=$

Write the remainders on a paper, and check the answers by adding.

652	864	716	527	405	943	358
439	592	438	350	227	776	279

2. Finding First Quotient Figure

Name the quotient figure for each example. Then multiply the divisor by the quotient figure. Can the product be subtracted from the dividend?

$45\overline{)89}$	$17\overline{)37}$	$19\overline{)55}$	$27\overline{)68}$	$41\overline{)96}$
$28\overline{)215}$	$67\overline{)324}$	$83\overline{)419}$	$46\overline{)305}$	$90\overline{)200}$
$31\overline{)65}$	$53\overline{)109}$	$24\overline{)120}$	$48\overline{)470}$	$65\overline{)130}$

Fill the blank spaces correctly. Say all the steps and finish each example.

$\begin{array}{r}?3\\24\overline{)1992}\end{array}$	$\begin{array}{r}?2\\27\overline{)1404}\end{array}$	$\begin{array}{r}?2\\18\overline{)1296}\end{array}$

CURING OUR WEAK SPOTS

3. Zero in Dividend or Quotient

Read and say the words to fill the blanks correctly. $2912 \div 14 = ?$

$$\begin{array}{r} 208 \\ 14\overline{)2912} \\ \underline{28} \\ 112 \\ \underline{112} \end{array}$$

(1) Divide: How many 14's in 29? 2. Write 2 in the quotient over 9.
(2) Multiply: $2 \times \_\_ = 28$. Write 28 under __.
(3) Subtract: 28 from $29 = 1$
(4) Bring down 1.
(1) The divisor 14 is too large for 11. Write __ in the quotient.
(4) Bring down the next dividend figure, 2.
(1) Divide: $112 \div 14 = \_\_$. Write 8 in the quotient over __ you brought down.
(2) Multiply: $8 \times 14 = \_\_$. Write 112 under __.
(3) Subtract.

$2912 \div 14 = 208$.

Finish these examples.

$$\begin{array}{r} \text{- - - 4 r} \\ 26\overline{)7804} \\ \underline{78} \\ 04 \end{array} \qquad \begin{array}{r} \text{- - - 3 r} \\ 12\overline{)1311} \\ \underline{12} \\ 111 \end{array} \qquad \begin{array}{r} \text{- -} \\ 25\overline{)1200} \\ \underline{\text{- - -}} \\ 200 \end{array}$$

Copy these examples and divide:

$19\overline{)7695}$ $15\overline{)3045}$ $12\overline{)2664}$ $25\overline{)5100}$

CURING OUR WEAK SPOTS

4. Divisors Ending in 7, 8, or 9

$$\begin{array}{r} 162 \\ 39\overline{)6318} \\ \underline{39} \\ 241 \\ \underline{234} \\ 78 \\ \underline{78} \end{array}$$

1. Why is 1 the first quotient figure? How do you know where to put it?
2. How do you get 6 as the second quotient figure?
3. How do you get 234?
4. How do you get two 78's?

$$\begin{array}{r} 25 \\ 38\overline{)954} \\ \underline{76} \\ 194 \\ \underline{190} \\ 4\text{ r} \end{array}$$

1. How do we get 2 as the first figure in the quotient?
2. How do we get 76?
3. How do we get 194?
4. How do we know that 5 is the second figure in the quotient?
5. How do we get the remainder 4?

Copy these examples and divide.

22)345	50)\$11.50	80)320	61)915
72)800	51)4396	42)\$13.86	31)1572
27)548	19)4721	38)\$15.65	79)\$14.73
18)1000	37)7430	49)9836	17)\$26.51

WINNERS' PAGE
For the pupils who made no mistakes on page 96.

AS FAR AS WE GO IN DIVISION

1. In 1927 Mr. Burns sold his 320-acre farm for \$50,880. How much did he get for each acre? $\$50,880 \div 320 = ?$

$$\begin{array}{r} \$\ \ 1\text{--}\text{--} \\ 320\overline{)\$50880} \\ 320 \\ \overline{1888} \\ \text{----} \\ \overline{} \\ \text{----} \\ \text{----} \\ \overline{} \end{array}$$

(1) Divide: $508 \div 320 = ?$ 1. Write 1 in the quotient.

(2) Multiply: $1 \times 320 = 320$

(3) Subtract: 320 from $508 = 188$. Bring down 8.

Finish the problem.

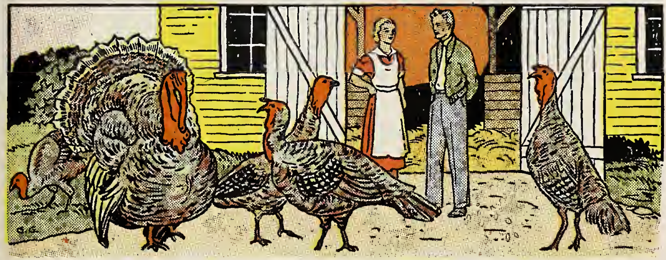
Mr. Burns received __ an acre for his farm.

2. Mr. Burns took his family on a trip to California and back. The distance he had to travel in order to visit all the points on the way was about 6175 miles. If they averaged 175 miles a day, how long did it take the Burns family to make the trip?

Divide and check.

3. $341\overline{)11594}$	**4.** $704\overline{)38720}$	**5.** $536\overline{)70752}$
6. $652\overline{)47596}$	**7.** $535\overline{)36380}$	**8.** $463\overline{)38892}$
9. $807\overline{)210627}$	**10.** $657\overline{)88695}$	**11.** $214\overline{)17762}$
12. $286\overline{)94952}$	**13.** $540\overline{)34560}$	**14.** $108\overline{)9936}$

WINNERS' PAGE
For the pupils who made no mistakes on page 96.



MAKING YOU THINK

1. Mary's mother sold 24 turkeys. Their weight altogether was 384 lb. What was the average weight of the turkeys?

2. On 59 acres of land, Mr. Mack raised 3540 bushels of corn. How many bushels to the acre did his corn average?

3. John's father sold 70 bushels of oats for $24.50. What was the price per bushel?

4. A load of wheat weighs 1710 lb. At 60 lb. to the bushel, how many bushels are in the load? How many pounds over that number of bushels are in the load?

5. Ninety bushels of corn sold for $61.20. What was the price per bushel?

6. Fifty bushels of potatoes sold for $37.50. What was the price per bushel?

WINNERS' PAGE
For the pupils who made no mistakes on page 96.

MAKING YOU THINK

1. At the end of the year Alice added all the gas bills her mother had paid that year. The total for the year was $25.80. How could Alice find the average cost for each month? Find it.

2. Alice saw that the groceries and meat for the 28 days in February last year cost the family $58.24. What was the average cost each day?

3. Without using pencil, tell what number you would use as the first quotient figure in each of these examples:

82)3890	79)4379	58)$23.78	89)7524
69)$62.79	42)$319.20	38)4028	91)10423

4. Copy the examples in exercise 3 and divide. Check your work.

1. If your class bought a dozen roses for your teacher after her illness and the roses cost $2.00, how could you find each pupil's share of the cost?

2. Your principal at school puts up a list every week showing the different grades and the amount of money each grade banks. How can you find out how much the whole school banks each week?

3. Your principal gives first place to the room that banks the most money each week. How can you find out how much less your room has banked than the first room?

4. Your mother needs 6 eggs to make a cake. If she knows the price of a dozen eggs, how can she find out how much the eggs for the cake will cost?

5. Paper comes in packages of 500 sheets. How do you find how many small packages of 20 sheets each can be made from one of the larger packages?

6. If you are 6 pounds underweight, how can you find what you ought to weigh?

7. Sue takes care of a neighbor's baby 3 hours on Saturday. She receives 25¢ an hour. How will she know how much money she should get?

THE BOY HUNTER

George lives in Wisconsin near some big woods where there is a small river. He spends most of his playtime in the woods. Below are some of the problems that George needs to solve.

Number your paper for 10 problems. After each number write a letter to show what you would do to solve the problem. Then solve it.

If you would add, write A after the problem.
If you would subtract, write S.
If you would multiply, write M.
If you would divide, write D.

1. Last winter George and his brother Lloyd caught 11 mink in their traps. They were paid an average price of $4.50 each for the skins. How much money did they receive?

2. The boys divided the money from the mink skins evenly, because they took turns going to their traps every morning and evening. How much money did each boy receive as his share?

3. A visit to all the traps once every day was a trip of 3 miles. How many miles did George walk in January last year? (There are 31 days in January.)

4. The boys' uncle sent them a flashlight to use in the woods. It throws a light $\frac{1}{12}$ of a mile. How many feet is that? (5280 ft. = 1 mi.)

5. George wants to order a hunting knife. The knife costs \$2.39 and the postage is \$0.08. How much money should George send with his order?

6. This year the boys are going to enter the pelts they get in a contest at the National Fur Show. The prizes offered are: \$2000, 1st prize; \$500, 2nd prize; \$250, 3rd prize; \$100, 4th prize; and \$10 for each of the next 215 prizes. How many prizes are there?

7. Lloyd plans to get snowshoes this winter. He can get the kind he wants for \$7.35. If he gets sandals to keep the snowshoes from slipping, they will cost \$1.15 more. How much would he need to pay if he gets the snowshoes and the sandals?

8. George was given \$5 for his birthday. He is going to spend it for new skis. He can buy a pair made of white hickory for \$3.95, or a pair made of yellow pine for \$2.18. He would rather have the hickory ones, for they wear better. If he buys that kind, how much will he have left out of his \$5?

9. George's father took him to Detroit last winter when the best ski-jumper there jumped 136 feet. How much less was this than the 164-foot jump which was the world's record?

10. George needs a whole new winter outfit. How much will his new outfit cost if a leather coat costs \$11.85, a helmet \$1.50, high boots \$5.95, and leather mittens \$1.15?

PROBLEMS OF DAILY LIFE

In each of these problems you will need to add and also to subtract. Such problems are called **two-step problems.**

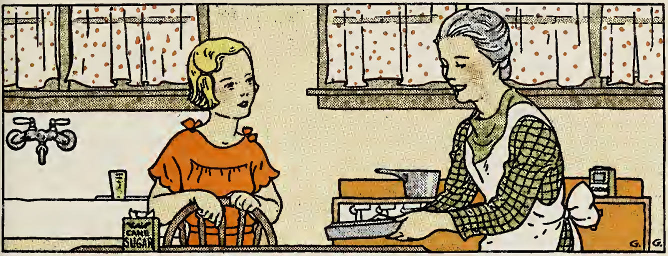
In solving the problems, first read each one through carefully, then ask these questions:

(a) What am I to find out first?
(b) Do I add or subtract?
(c) What am I to find out next?
(d) Do I add or subtract?
(e) Have I answered the question asked in the problem?
(f) Does the answer seem reasonable? Does it seem as if it would be right?

1. On Vera's birthday her father gave her $5.00, her grandfather gave her $2.00, and her big brother gave her $1.00. She spent $2.50 for a pair of skates and put the rest of the money in the savings bank. How much money did she put in the bank?

2. Arnold likes to hunt eggs at his grandfather's farm. Last night he found 15 eggs in the barn, 12 in a strawstack, and 16 in the henhouse. His grandfather told him to bring 10 eggs into the kitchen and put the rest in the case to be sold. How many did he put in the case?

3. Mrs. Barr bought 12 yards of lace. She used 5 yards to trim some handkerchief cases for Christmas presents, 4 yards to trim a baby dress, and 2 yards on a collar. She gave Edith the rest for a doll dress. How many yards did she give to Edith?



4. Emma's mother made candy last evening. She cut it into 36 pieces. She put 18 pieces in a box for Emma's teacher, sent 8 pieces to a little neighbor girl, saved 8 pieces for the next day, and told Emma she might have the rest. How many pieces were left for Emma?

5. Last Saturday Ted earned 75¢ cleaning snow from a neighbor's walks. He earned $1.05 by selling popcorn balls and 65¢ selling *The Saturday Evening Post.* With some of this money he bought a season ticket to the ball games at school for $1.75. How much did he have left?

6. Miss Mason gave her class 75 problems to do in one week. Paul solved 15 of the problems the first day, and 14 more at home that night. The next day he solved 23 at school and 6 at home. How many problems did he have left to do after the second day?

7. We had 43 children in our class when school opened. During October, 9 more children entered the class, 3 moved away, and 4 were promoted to another grade. How many children were in the class at the end of October?

BUYING PROBLEMS

You have been solving two-step problems in which you needed to use both addition and subtraction. Sometimes you need to use other steps. To solve the problem below you need to use multiplication and addition.

Ask yourself these questions to keep your thinking straight:

(a) What am I to find first? How?

(b) What am I to find next? How?

(c) Have I answered the question asked in the problem?

(d) Does the answer seem reasonable? Does it sound as if it would be right?

Now solve the first problem.

1. Last week Joe mowed lawns for 3 hours. He gets paid 25¢ an hour for this work. His father gave him 20¢ an hour for washing the car which took him $2\frac{1}{2}$ hours. How much did he earn last week?

(a) What am I to find first? How much he earned at each job. How? Multiply: $3 \times 25¢ = 75¢$. $2\frac{1}{2} \times 20¢ = 50¢$.

(b) What am I to find next? How much he earned altogether. How? Add: 75¢ and 50¢. The answer is \$1.25.

(c) Have I answered the question asked in the problem? Yes.

(d) Does my answer sound reasonable? Yes.

What steps should you use in the next problem?

2. Nell's mother sent her to the bakery to buy 2 doz. rolls at 20¢ a doz., 2 doz. cookies at 23¢ a doz., and a cake for 60¢. How much should Nell pay?

3. Betty bought $\frac{1}{2}$ doz. bananas at 22¢ a doz., $\frac{1}{2}$ doz. oranges at 42¢ a doz., and 4 apples at 5¢ each. How much did her fruit cost?

4. Edward is going to buy a new collar for Hans, his police dog. The collar will cost $1.39 if he buys a plain one. But he wants the dog's name put on the collar and this costs 5¢ for each letter in the name. What will be the cost of the collar with the name on it?

In problem 5 you need to divide and multiply. Why?

5. Ethel bought 180 Christmas cards. She put them in boxes with 10 cards in each box and sold them for 30¢ a box. How much money did she receive for the cards?

6. Mr. Harris is going to buy a new typewriter for $50. He plans to pay $5 when he orders it and finish paying for it by paying $5 each month. How many months will it take him to finish paying for the typewriter?

7. Our school buys scissors for the children at $2.40 a doz. If the school bought them by the single pair, the scissors would cost 29¢ for each pair. How much can be saved on each pair of scissors by buying them by the dozen?

PAINTING CHRISTMAS CARDS

1. Mollie and Sarah are painting Christmas cards. Sarah has finished 15 cards and has 11 more to paint. Mollie has painted 14 and has 15 more to paint. How many cards will they have when they finish?

2. Our school buys pens in boxes with 144 pens in each box. It puts them in little packages of 6 pens each and sells them for 5¢ a package. How much money does the school receive for one box of pens?

3. The children of the Holmes school are going to sell tickets for their operetta. They have 850 tickets to sell to grown people for 50¢ each, and 625 children's tickets to sell for 20¢ each. If they sell all the tickets, how much money will they take in?

4. The number of children in the fifth grade last week was: 30 on Monday, 32 on Tuesday, 32 on Wednesday, 30 on Thursday, and 31 on Friday. Find the average daily attendance for the week.

5. A school needs 85 tons of coal. The whole amount can be bought in one order for $513.40. In more than one order, the cost will be $7.50 a ton. How much can be saved by buying all the coal in one order?

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 18 minutes. Your score will be the number of problems you solve correctly.

When you use more than one step in a problem, read the problem carefully and ask yourself the questions you have used before in solving problems.

Scale		Score
A	Ex.	=6 or 5
B	Good	= 4
C	Fair	= 3
D	Poor	=2 to 0

1. Last Saturday two candy stores had sales. The Sweet Shop sold their chocolates at 3 pounds for \$1. The Sugar Bowl sold the same kind at 4 pounds for \$1.25. Which store had the lower price?

2. Last year our gas cost us \$18.30, electric light \$48.46, and water \$20.00. What was the total cost for the 12 months? The average for each month?

3. Mr. Judd bought 3 theater tickets at \$2.10 each. How much change should he receive from \$10?

4. Mrs. King wants to buy a new radio. It will cost \$79.65 if she pays cash for it. If she wishes, she may pay \$10 when she picks it out and then pay \$3 a week for 26 weeks. How much less will the radio cost if she pays for it all at once?

5. Mr. Brown bought an old Ford car for \$35. He spent \$18 for repairs, and \$6 for paint and polish. Then he sold it for \$85. How much did he gain?

6. Bob pulled 120 stalks of pieplant from his garden. He tied them in bunches of 10 stalks each and sold the bunches for 18¢ each. How much money will he receive if he sells all of the bunches?

PUTTING IN THE MISSING NUMBERS

In these problems the numbers are missing. Copy the problems and write in the numbers on your paper. Then solve the problems. Be sure to make your problem sound reasonable.

1. Helen's new winter coat cost $___. When her mother paid for it, she gave the clerk $___. How much change should she have received?

2. David took a long auto trip with his father last summer. When they left home, David saw that the speedometer on their car read ___ miles. When they reached home again at the end of two weeks, the speedometer read ___. How many miles had they driven on their trip?

3. Jack has saved $___ to buy a new kodak. The kodak will cost $___. How much more money will he need to save?

4. There are ___ children coming to our class picnic. Miss Lane said she would order ___ sandwiches so that every child might have ___.

5. Margaret went to town today to buy her Christmas presents. She paid ___ for a vase for her mother, ___ for a calendar for her father, and ___ for a baseball for her little brother. How much did she pay for the Christmas presents?

6. Our bill for water is $___ a month. How much is it for a year?

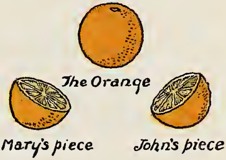
7. Our bill for light is $___ a month. How much is it for a year?

CHAPTER III

LEARNING ABOUT FRACTIONS

Finding a Part of a Thing

WHERE BOYS AND GIRLS SEE FRACTIONS

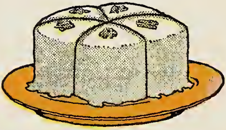


1. Mary's mother gave her an orange. Mary divided it into 2 equal parts and gave one part to her brother John.

How much of the orange did Mary get? We can write the answer this way: $\frac{1}{2}$. How much did John get? Write it.

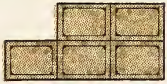
2. Sometimes your drawing teacher tells you to fold your paper into 4 equal parts, crease it at the folds, and then unfold it. When you open the paper, it looks like the picture.

What do you call each part? We write the answer this way: $\frac{1}{4}$.



3. Helen's mother divided a cake equally among the 5 children at Helen's party. How much of the cake did each child get?

Numbers such as $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{5}$ are called fractions.

FRACTIONS IN WORK AND PLAY

1. In the picture how much of the glass is filled with water?

2. What part of the bar of chocolate is missing?

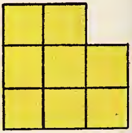
3. What part of the circle is colored?

4. What part of the square is colored?

5. Draw a cake. Divide it into 4 equal parts. How much of the cake is in each part?

6. Draw a line 6 inches long. Divide it into 6 equal parts. Each of the equal parts, or each inch is what **fractional part** of the whole line?

7. Draw a circle. Divide it into 8 equal parts. Color one part. How much of the circle did you color?



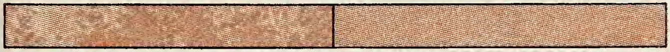
8. A square has been divided into 9 equal parts and one of them has been taken away. How much of the square has been taken away?

9. A large cake has been divided into 7 equal pieces. If you eat one of the pieces, how much cake do you eat?

When you write the fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{9}$ in words, write them this way: one-half, one-fourth, one-sixth, one-eighth, and one-ninth.

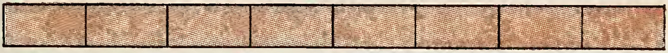
DIVIDING THINGS

1. This piece of ribbon has been divided into two equal parts. What is each part called? Write it as a fraction.

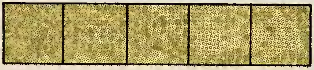


2. Each half of the ribbon below has been divided into two equal parts. How many parts do we now have? What is each part called? What would three of these parts be called? Write three of these parts as a fraction.

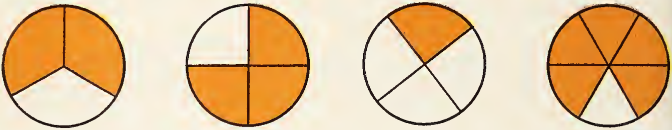
3. Each fourth of the ribbon has been divided into two equal parts. How many parts do we now have? What is each part called? Write it as a fraction. What would three parts be called? Five parts? Seven parts? Write each as a fraction.



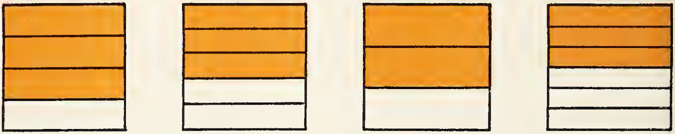
4. Louise divided a bar of candy into five equal parts. She gave two parts to her sister and one part to her little brother. What fractional part did her sister get? Her little brother? How much did she have left for herself?



1. Place a piece of paper under these circles. Under each circle write on the paper what part has been colored.



2. Place a piece of paper under these squares. Under each square write on the paper what part has been colored.



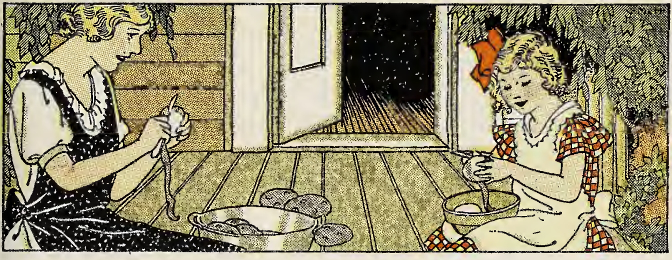
Numbers such as $\frac{3}{4}$, $\frac{3}{8}$, $\frac{2}{5}$, $\frac{5}{6}$, $\frac{7}{8}$, $\frac{2}{3}$, and $\frac{4}{7}$ are called **fractions**.

3. There are 2 pints in a quart. One pint is what fractional part of a quart?

4. There are 3 feet in a yard. One foot is what fractional part of a yard? Two feet is what fractional part of a yard?

5. There are 4 pecks in a bushel. One peck is what part of a bushel? Two pecks are what part of a bushel? Three pecks?

6. There are 8 quarts in one peck. One quart is what part of a peck? Two quarts are what part of a peck? Three quarts? Five quarts?



1. Mary is helping her mother pare potatoes for dinner. They have 9 potatoes to pare. Mother has pared 4. What part of all the potatoes has she pared? Mary has pared 2. What part of all the potatoes has Mary pared? What part of all the potatoes do they still have to pare?

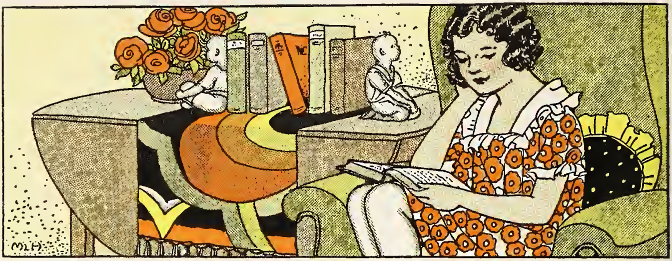
2. Tom wants to earn money for a new sled that costs 4 dollars. He has earned 3 dollars. The 3 dollars that he has earned is what part of the price of the sled? What part of the price of the sled is not yet earned?

3. There are 5 cents in a nickel. Two cents are what part of a nickel? Three cents? Four cents?

4. There are 10 cents in a dime. Four cents are what part of a dime? Seven cents? Nine cents?

5. There are 12 inches in a foot. Five inches are what part of a foot? Seven inches?

6. A gardener had 8 beds of rose bushes to trim. He trimmed 5 of them in the morning and 3 in the afternoon. What part of all the beds did he trim in the morning? In the afternoon?



1. Ann has 6 books to read. When she has read one of them, what part of the books has she read? What part of all these books does she still have to read?

2. If you had 4 pennies and spent 3 of them, what part of all these pennies did you spend? What part of them did you have left?

3. Joe has 3 apples. If he eats 2 of them, what part of all his apples will be left?

4. Marie goes to school 5 days each week. What part of 7 days does she go to school?

5. One of the blocks on Park street has 9 houses. Renters live in 2 of the houses, and the owners live in the other houses. What part of all the houses in the block do the renters use? What part do the owners use?

6. Jane's father has 7 letters to write. He has written 3 of them. What part of the 7 letters has he written? What part has he left to write?

7. James went to a picnic with 5 other boys. Their street car fare was 42¢. If they shared their expenses equally, what fractional part of the fare should James pay?

LEARNING ABOUT NUMERATOR AND DENOMINATOR

1. The two numbers in a fraction are the **terms** of the fraction. In $\frac{1}{3}$ the terms are **1** and **3**. What are the terms in the following fractions?

$\frac{1}{4}$ $\frac{3}{4}$ $\frac{2}{5}$ $\frac{4}{7}$ $\frac{5}{6}$ $\frac{7}{8}$

2. Each of the two terms in a fraction has a name. The upper term is called the **numerator.** In the fraction $\frac{3}{4}$ the numerator is **3**. What are the numerators in the following fractions?

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{5}{6}$ $\frac{3}{4}$ $\frac{7}{8}$ $\frac{4}{5}$ $\frac{3}{7}$ $\frac{8}{9}$

3. The lower term of a fraction is called the **denominator.** In the fraction $\frac{3}{4}$ the denominator is **4**. What are the denominators in the fractions in exercise 2?

4. Irene has read $\frac{2}{3}$ of a book. The denominator 3 shows you we are thinking that Irene's book is divided into 3 equal parts. The numerator 2 shows you how many of these parts she has read. How many thirds of the book has she read?

5. Richard has learned $\frac{3}{4}$ of a list of words that he wants to know. In this fraction the denominator 4 shows you that there are 4 equal parts in the list. The numerator shows you how many of these 4 parts Richard has already learned. How many parts of the list has he learned?

6. What does each numerator and each denominator in the following fractions mean?

$\frac{3}{4}$ of a piece of chalk
$\frac{5}{6}$ of a glass of milk
$\frac{3}{5}$ of a lemon pie
$\frac{7}{8}$ of a bottle of ink

1. This line is 1 inch long. It has been divided into 8 equal parts. Each fractional part is $\frac{1}{8}$. As there are $\frac{8}{8}$ in the whole line, we know that $\frac{8}{8}=1$.

2. If you take 5 of the parts, you have the fraction $\frac{5}{8}$. Is the numerator more or less than the denominator?

A fraction less than 1, like $\frac{5}{8}$, is a **proper fraction.**

> **In proper fractions the numerator is always less than the denominator.**

3. This line is $\frac{9}{8}$ inches long.

In a whole inch there are $\frac{8}{8}$. Is $\frac{9}{8}$ more or less than a whole inch?

4. A fraction that is more than a whole, like $\frac{9}{8}$, is an **improper fraction.** A fraction that is equal to a whole, like $\frac{8}{8}$, is called an **improper fraction.**

> **In improper fractions the numerator is always equal to or more than the denominator.**

5. Tell why the following are proper fractions:

$\frac{1}{3}$ $\frac{2}{5}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{7}{8}$ $\frac{5}{6}$

6. Tell why the following are improper fractions:

$\frac{11}{9}$ $\frac{6}{5}$ $\frac{4}{4}$ $\frac{3}{2}$ $\frac{13}{6}$ $\frac{9}{7}$

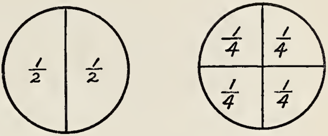
7. Are these fractions proper or improper? Write them in two lists, and name each list correctly.

$\frac{3}{5}$ $\frac{10}{9}$ $\frac{9}{8}$ $\frac{3}{3}$ $\frac{4}{5}$ $\frac{1}{12}$ $\frac{11}{7}$

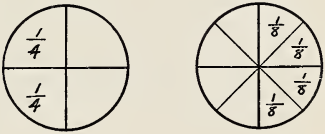
$\frac{8}{6}$ $\frac{12}{12}$ $\frac{3}{8}$ $\frac{2}{2}$ $\frac{7}{16}$ $\frac{16}{7}$ $\frac{13}{4}$

COMPARING PARTS

1. Look at these two circles. One is divided into halves and the other into fourths. How many fourths are equal to one half? How many fourths are equal to two halves?



2. Look at these two circles. One has been divided into fourths and the other into eighths. How many eighths are equal to $\frac{1}{4}$? To $\frac{2}{4}$? To $\frac{3}{4}$? To $\frac{4}{4}$?



3. Tell what number belongs in each blank:

$\frac{1}{2}=\frac{\ }{4}$ $\quad\frac{2}{2}=\frac{\ }{4}$ $\quad\frac{1}{4}=\frac{\ }{8}$ $\quad\frac{2}{4}=\frac{\ }{8}$ $\quad\frac{3}{4}=\frac{\ }{8}$ $\quad\frac{4}{4}=\frac{\ }{8}$

4. Fractions that are of equal value, like $\frac{1}{4}$ and $\frac{2}{8}$, or $\frac{3}{4}$ and $\frac{6}{8}$, are called **equivalent fractions.**

5. From the pictures above write the equivalent fractions that you see, such as $\frac{1}{4}=\frac{2}{8}$.

6. Draw and divide lines to show that these pairs of fractions are equivalent fractions:

$\frac{1}{3}=\frac{3}{9}$ $\quad\frac{2}{3}=\frac{6}{9}$ $\quad\frac{3}{3}=\frac{9}{9}$

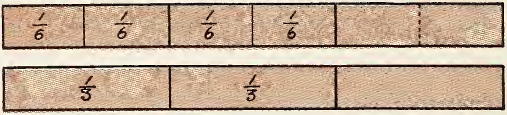
$\frac{1}{5}=\frac{2}{10}$ $\quad\frac{2}{5}=\frac{4}{10}$ $\quad\frac{5}{5}=\frac{10}{10}$

7. Take a foot rule and show that

$\frac{1}{6}=\frac{2}{12}$ $\quad\frac{2}{6}=\frac{4}{12}$ $\quad\frac{3}{6}=\frac{6}{12}$

$\frac{4}{6}=\frac{8}{12}$ $\quad\frac{5}{6}=\frac{10}{12}$ $\quad\frac{6}{6}=\frac{12}{12}$

1. From these lines show that $\frac{4}{6}=\frac{2}{3}$.



When we change a fraction to an equivalent fraction that has a smaller numerator and a smaller denominator, we are **changing the fraction to lower terms.**

2. Draw and divide lines to prove that the lower terms to which these fractions have been changed are correct.

$\frac{2}{4}=\frac{1}{2}$ $\frac{6}{10}=\frac{3}{5}$ $\frac{2}{8}=\frac{1}{4}$ $\frac{6}{8}=\frac{3}{4}$

3. Here is a way to show how to change $\frac{6}{8}$ to $\frac{3}{4}$ without drawing lines.

$$\frac{6 \div 2}{8 \div 2}=\frac{3}{4}$$

4. We can change fractions to equivalent fractions of lower terms by dividing the numerator and the denominator by the same number, as in the following.

$$\frac{8 \div 2}{10 \div 2}=\frac{4}{5} \qquad \frac{12 \div 4}{16 \div 4}=\frac{3}{4}$$

To change a fraction to lower terms, divide the numerator and the denominator by the same number.

5. Reduce the following fractions to lower terms.

$\frac{6}{9}$	$\frac{8}{14}$	$\frac{6}{15}$	$\frac{3}{12}$	$\frac{6}{8}$	$\frac{6}{16}$
$\frac{9}{15}$	$\frac{10}{15}$	$\frac{9}{12}$	$\frac{18}{20}$	$\frac{6}{14}$	$\frac{14}{20}$

1. To change $\frac{8}{12}$ to lower terms, divide both 8 and 12 by 2. Read the example in the box at the right.

$$\frac{8 \div 2}{12 \div 2} = \frac{4}{6}$$

2. To change the fraction $\frac{4}{6}$ to still lower terms, you can divide both terms by 2 again. Read the example at the right. What does $\frac{8}{12}$ equal in the lowest terms?

$$\frac{4 \div 2}{6 \div 2} = \frac{2}{3}$$

3. By what number could we have divided both 8 and 12 at first to give it in the lowest terms by dividing only once? Read the example.

$$\frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

4. To change $\frac{12}{18}$ to lowest terms by dividing 12 and 18 by only one number, look at 12 and 18 and tell what is the largest number that will divide both of them evenly. Then read the example at the right and tell the lowest terms for $\frac{12}{18}$.

$$\frac{12 \div 6}{18 \div 6} = \frac{2}{3}$$

Before you begin to divide, think of the largest number that will divide both the numerator and the denominator of the fraction.

To change a fraction to lowest terms, divide both numerator and denominator by the largest possible number.

5. Reduce the following fractions to lowest terms.

$\frac{16}{20}$	$\frac{12}{15}$	$\frac{8}{24}$	$\frac{6}{18}$	$\frac{12}{24}$	$\frac{8}{20}$	$\frac{12}{16}$
$\frac{10}{30}$	$\frac{6}{12}$	$\frac{8}{16}$	$\frac{20}{24}$	$\frac{7}{21}$	$\frac{9}{12}$	$\frac{5}{15}$

You have learned that $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions. When we change a fraction to an equivalent fraction that has a larger numerator and a larger denominator, we are changing the fraction to **higher terms.**

1. Draw and divide lines to prove that the higher terms for the fractions below are correct.

$\frac{1}{5}=\frac{2}{10}$ $\quad$ $\frac{1}{4}=\frac{2}{8}$ $\quad$ $\frac{4}{5}=\frac{8}{10}$ $\quad$ $\frac{3}{4}=\frac{6}{8}$

2. Here is a way to change $\frac{3}{4}$ to $\frac{6}{8}$ without drawing lines. (Always read $\times$ "times.") Read the example and tell by what number you multiply each term of the fraction. What equivalent fraction do you get?

$$\frac{2\times 3}{2\times 4}=\frac{6}{8}$$

3. We can change $\frac{3}{4}$ to other equivalent fractions of higher terms by multiplying the numerator and the denominator by some number besides 2. Read the examples below. What equivalent fractions do you get when you multiply each term of $\frac{3}{4}$ by 3? By 4?

$$\frac{3\times 3}{3\times 4}=\frac{9}{12} \qquad \frac{4\times 3}{4\times 4}=\frac{12}{16}$$

To change a fraction to higher terms, multiply the numerator and the denominator by the same number.

4. Change $\frac{1}{2}$ to $\frac{}{6}$.

$\boxed{\frac{1}{2}=\frac{}{6}}$

By what number must we multiply the denominator 2 to give us the new denominator 6? By 3.

Multiply each term of $\frac{1}{2}$ by 3.

What is the equivalent fraction?

5. Change these fractions to higher terms:

$\frac{1}{2}=\frac{}{8}$ $\quad$ $\frac{1}{2}=\frac{}{10}$ $\quad$ $\frac{1}{3}=\frac{}{9}$ $\quad$ $\frac{1}{4}=\frac{}{20}$

DIVIDING APPLES AND CANDY

1. Ralph's mother gave him 3 apples to divide equally between his sister Lucy and himself. Look at the picture and tell how much Ralph should give to Lucy. How much would he have left for himself?

$1\frac{1}{2}$ is a whole number and a fraction written together. It is called a **mixed number.**

2. Mary and three friends had a party. There were 5 pieces of cake to be divided equally among the girls. How much cake did each one get?

Each girl got 1 whole piece of cake and $\frac{1}{4}$ of another piece.

$1\frac{1}{4}$ is called a mixed number because it is a whole number and a fraction written together.

3. Which of the following are mixed numbers?

$\frac{2}{3}$	$1\frac{2}{3}$	$2\frac{4}{5}$	$\frac{8}{6}$	$4\frac{1}{7}$	$12\frac{1}{2}$
$\frac{3}{8}$	$\frac{3}{5}$	$1\frac{1}{5}$	$7\frac{3}{4}$	$\frac{5}{7}$	2
$1\frac{3}{4}$	$2\frac{1}{3}$	$\frac{5}{6}$	$\frac{9}{10}$	$5\frac{1}{4}$	$6\frac{2}{3}$
$3\frac{1}{2}$	$\frac{3}{8}$	$3\frac{1}{2}$	$\frac{4}{5}$	$6\frac{1}{5}$	$7\frac{1}{4}$

Changing Improper Fractions to Whole or Mixed Numbers

AL'S MONEY

4 Quarter Dollars

1 Quarter Dollar

1. Al had 4 quarter dollars in his bank and got another quarter dollar for raking leaves. How much money did he have then? $\frac{5}{4} = ?$

One Way

4 quarter dollars = 1 dollar
1 quarter dollar = $\frac{1}{4}$ dollar
5 quarter dollars = $1\frac{1}{4}$ dollars

Another Way

$$\begin{array}{r} 1\frac{1}{4} \\ 4\overline{)5} \end{array}$$

Divide the numerator by the denominator. In $\frac{5}{4}$ there are $\frac{4}{4}$, or 1, and $\frac{1}{4}$ remainder. Al then had a dollar and a quarter, or $1\frac{1}{4}$ dollars.

To change an improper fraction to a whole number or to a mixed number, divide the numerator by the denominator.

2. Reduce the following improper fractions to mixed numbers or to whole numbers.

$\frac{5}{3}$	$\frac{9}{7}$	$\frac{7}{5}$	$\frac{10}{10}$	$\frac{15}{4}$	$\frac{19}{6}$
$\frac{6}{6}$	$\frac{8}{3}$	$\frac{11}{4}$	$\frac{7}{2}$	$\frac{13}{5}$	$\frac{21}{8}$

1. On Saturdays Ernest works in a grocery store. He has learned to sell some kinds of groceries and meats by weight. He knows that 1 pound is 16 ounces, and if he sells 1 pound 8 ounces of butter, he writes it on the ticket $1\frac{1}{2}$ lb. He does this because 8 ounces are $\frac{8}{16}$ of a pound, or $\frac{1}{2}$ pound.

In Ernest's problem you divide both terms of $\frac{8}{16}$ by ___. This changes it to the lowest terms, $\frac{1}{2}$. Adding $\frac{1}{2}$ to 1 shows the amount sold was $1\frac{1}{2}$ lb.

2. Change 1 pound 6 ounces to a mixed number of pounds.

3. One Saturday Ernest sold Mrs. Hooker a roast of beef that weighed 3 pounds and 12 ounces. How many pounds should Ernest write on the sales ticket?

4. Mrs. Hooker also bought 1 pound and 4 ounces of sliced bacon. How many pounds of bacon did Mrs. Hooker buy? Give the answer as a mixed number.

5. Change 4 pounds 9 ounces to a mixed number.

FINDING OUR WEAK SPOTS

If you have any weak spots in changing fractions, this test will help to find them. Write the examples on your paper. Number each exercise as in the test. Your teacher will sometimes have you do part of an example out loud to find your weak spot.

Changing Fractions

1. Copy these fractions in two lists. Write the proper fractions in one list under the heading, "Proper Fractions," and the improper fractions in another list under the heading, "Improper Fractions."

$\frac{2}{3}$ $\frac{6}{4}$ $\frac{3}{2}$ $\frac{5}{8}$ $\frac{4}{4}$ $\frac{5}{6}$ $\frac{6}{5}$

2. Change to whole numbers or to mixed numbers.

$\frac{11}{5}$ $\frac{14}{7}$ $\frac{8}{3}$ $\frac{7}{2}$ $\frac{13}{6}$ $\frac{9}{9}$ $\frac{5}{4}$

3. Change to higher terms.

$\frac{1}{3}=\frac{}{9}$ $\frac{1}{4}=\frac{}{24}$ $\frac{1}{8}=\frac{}{16}$ $\frac{3}{8}=\frac{}{24}$

$\frac{1}{2}=\frac{}{10}$ $\frac{2}{3}=\frac{}{12}$ $\frac{3}{5}=\frac{}{20}$ $\frac{2}{3}=\frac{}{6}$

4. Change to lowest terms.

$\frac{8}{12}$ $\frac{6}{9}$ $\frac{5}{10}$ $\frac{4}{16}$ $\frac{6}{8}$ $\frac{2}{4}$ $\frac{9}{12}$

$\frac{8}{14}$ $\frac{12}{16}$ $\frac{3}{6}$ $\frac{10}{15}$ $\frac{14}{21}$ $\frac{24}{30}$ $\frac{5}{15}$

CURING OUR WEAK SPOTS

If you made mistakes in any of the exercises on page 128, do the exercise of the same number on this page. Then try that part of the test again.

Changing Fractions

1. Copy these fractions in two lists. Write the proper fractions in one list under the heading, "Proper Fractions," and the improper fractions in another list under the heading, "Improper Fractions."

$\frac{8}{9}$	$\frac{7}{7}$	$\frac{3}{4}$	$\frac{9}{12}$	$\frac{2}{6}$	$\frac{7}{4}$	$\frac{8}{8}$
$\frac{10}{6}$	$\frac{7}{8}$	$\frac{6}{5}$	$\frac{8}{5}$	$\frac{6}{4}$	$\frac{2}{3}$	$\frac{4}{5}$

2. Change to whole numbers or to mixed numbers.

$\frac{7}{5}$	$\frac{7}{6}$	$\frac{8}{5}$	$\frac{5}{2}$	$\frac{17}{12}$	$\frac{19}{15}$	$\frac{21}{20}$
$\frac{9}{9}$	$\frac{8}{4}$	$\frac{17}{15}$	$\frac{10}{8}$	$\frac{12}{6}$	$\frac{4}{4}$	$\frac{11}{5}$

3. Change to higher terms.

$\frac{2}{5}=\frac{\quad}{15}$	$\frac{1}{7}=\frac{\quad}{14}$	$\frac{5}{6}=\frac{\quad}{12}$	$\frac{4}{5}=\frac{\quad}{10}$
$\frac{3}{4}=\frac{\quad}{8}$	$\frac{1}{2}=\frac{\quad}{6}$	$\frac{1}{4}=\frac{\quad}{16}$	$\frac{1}{2}=\frac{\quad}{14}$

4. Change to lowest terms.

$\frac{10}{12}$	$\frac{3}{15}$	$\frac{8}{20}$	$\frac{4}{8}$	$\frac{12}{15}$	$\frac{8}{10}$	$\frac{15}{25}$
$\frac{3}{9}$	$\frac{16}{20}$	$\frac{21}{24}$	$\frac{9}{15}$	$\frac{7}{21}$	$\frac{6}{16}$	$\frac{18}{24}$
$\frac{8}{12}$	$\frac{3}{9}$	$\frac{5}{15}$	$\frac{6}{8}$	$\frac{2}{6}$	$\frac{12}{20}$	$\frac{3}{12}$

Adding Fractions That Have the Same Denominator

Adding 1 fifth and 1 fifth is like adding 1 apple and 1 apple, or like adding 1 pencil and 1 pencil.

1 apple and 1 apple = 2 apples
1 pencil and 1 pencil = 2 pencils
1 fifth and 1 fifth = 2 fifths

The denominator gives the name of a fraction.

1. 1 fifth and 1 fifth are fractions having the same denominator. Add them.

$$\boxed{\begin{array}{c} \frac{1}{5} \\ \frac{1}{5} \\ \hline \frac{2}{5} \end{array}} \qquad \text{1 fifth and 1 fifth} = \text{2 fifths}$$

To add fractions having the same name, add the numerators.

2. Do the fractions in each of these addition problems have like denominators? How would you add these fractions? Give the sums.

$$\begin{array}{ccccccc} \frac{1}{3} & \frac{2}{4} & \frac{1}{7} & \frac{3}{6} & \frac{1}{9} & \frac{2}{5} & \frac{4}{6} \\ \frac{1}{3} & \frac{1}{4} & \frac{1}{7} & \frac{2}{6} & \frac{1}{9} & \frac{2}{5} & \frac{1}{6} \\ \hline \end{array}$$

3. Sometimes in adding fractions having the same denominator the sum needs to be reduced to lowest terms, for example:

$$\frac{1}{6} + \frac{3}{6} = \frac{4}{6} \qquad\qquad \frac{4}{6} = ?$$

4. Add these fractions. Which answers did you need to reduce?

$$\begin{array}{cccccccc} \frac{1}{6} & \frac{1}{5} & \frac{4}{8} & \frac{1}{4} & \frac{3}{8} & \frac{3}{9} & \frac{2}{7} & \frac{2}{10} \\ \frac{2}{6} & \frac{2}{5} & \frac{2}{8} & \frac{1}{4} & \frac{3}{8} & \frac{2}{9} & \frac{2}{7} & \frac{4}{10} \\ \hline \end{array}$$

Adding Fractions with Like Denominators

1. John read $\frac{1}{3}$ of the book, *Doctor Dolittle*, on Saturday evening and $\frac{2}{3}$ on Sunday afternoon. How much of the book did he read in the two days?

$$\begin{array}{r} \frac{1}{3} \\ \underline{\frac{2}{3}} \\ \frac{3}{3} = 1 \end{array}$$

Sometimes in adding fractions we get a whole number for the sum.

2. The example at the right shows that when we add $\frac{1}{3}$ and $\frac{2}{3}$ of something we get $\frac{3}{3}$ or all of it.

$$\frac{1}{3} + \frac{2}{3} = \frac{3}{3}$$

3. Draw pictures to show that the sums of these fractions are whole numbers.

$$\begin{array}{c} \frac{1}{6} \\ \underline{\frac{5}{6}} \end{array} \qquad \begin{array}{c} \frac{2}{4} \\ \underline{\frac{2}{4}} \end{array} \qquad \begin{array}{c} \frac{2}{6} \\ \underline{\frac{4}{6}} \end{array} \qquad \begin{array}{c} \frac{3}{8} \\ \underline{\frac{5}{8}} \end{array} \qquad \begin{array}{c} \frac{2}{5} \\ \underline{\frac{3}{5}} \end{array}$$

4. Mary wants to make curtains for the two windows in her playhouse. She needs $\frac{2}{3}$ yard of cloth for each window. How much cloth should she buy?

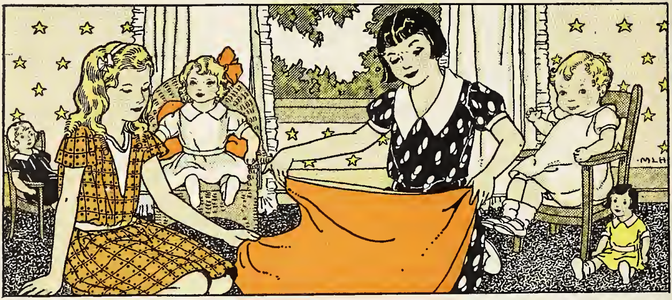
Sometimes when we add fractions we get an improper fraction that equals a mixed number.

$$\begin{array}{r} \frac{2}{3} \\ \underline{\frac{2}{3}} \\ \frac{4}{3} = 1\frac{1}{3} \end{array}$$

5. Alice also is sewing curtains for the two windows in her playhouse. She needs $\frac{5}{8}$ yard of cloth for each window. How much should she buy?

In adding $\frac{5}{8}$ and $\frac{5}{8}$ we get $\frac{10}{8}$. $\frac{10}{8} = 1\frac{2}{8}$. What must you do now to the $\frac{2}{8}$? Why?

$$\begin{array}{r} \frac{5}{8} \\ \underline{\frac{5}{8}} \\ \frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4} \end{array}$$



MAKING DOLL DRESSES

1. Mary and Alice are sewing new dresses for their dolls. They have two large dolls that they want to dress alike. They need 30 inches, or $\frac{5}{6}$ yard, for each dress. How much cloth should the girls get, if they both buy from the same piece?

2. Their two small dolls need $\frac{1}{4}$ yard of cloth each. How much cloth do they both buy for the small dolls?

3. The girls decide to trim all the dresses with lace. Alice finds that she will need $\frac{7}{8}$ yard of lace to trim the dresses, and Mary will need $\frac{5}{8}$ yard. If the girls buy the same kind of lace, how much lace do they buy together?

4. Add.

$\frac{3}{5}$	$\frac{4}{7}$	$\frac{5}{8}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{2}{7}$
$\frac{3}{5}$	$\frac{5}{7}$	$\frac{6}{8}$	$\frac{4}{5}$	$\frac{4}{6}$	$\frac{6}{7}$
$\frac{5}{9}$	$\frac{3}{5}$	$\frac{3}{10}$	$\frac{3}{6}$	$\frac{4}{8}$	$\frac{7}{9}$
$\frac{7}{9}$	$\frac{4}{5}$	$\frac{9}{10}$	$\frac{5}{6}$	$\frac{6}{8}$	$\frac{7}{9}$

LEST YOU FORGET

1. Add:

6	26	456	$ 1.75	$ .45
5	32	785	3.85	2.50
3	84	192	10.50	.09
8		348	2.25	1.98

$1.59	2359	9824	2985	6895
2.45	483	4065	6437	208
6.76	916	192	2059	419
9.49	1001	3425	406	3454

2. Subtract:

65	794	2000	$10.00	$15.75
37	348	295	2.05	8.96

3. Multiply:

35	108	862	196	$7.50
6	30	758	303	.15

$6.45	$13.62	$97.43	1059	3768
24	69	107	496	827

4. Divide:

$8\overline{)65}$	$28\overline{)1988}$	$16\overline{)4928}$	$125\overline{)72500}$	$5\overline{)\$25.75}$
$9\overline{)85}$	$11\overline{)451}$	$32\overline{)6400}$	$256\overline{)6656}$	$4\overline{)\$24.16}$

MAKING THINGS

1. Irene wants to make $\frac{5}{6}$ yard of tatting for the dresser scarf in her doll's bedroom. She has made $\frac{4}{6}$ yd. How much tatting does she still have to make?

Subtracting sixths is just like subtracting apples or pencils.

$$\begin{array}{r} \frac{5}{6} \\ \frac{4}{6} \\ \hline \frac{1}{6} \end{array}$$

5 apples − 4 apples = 1 apple
5 pencils − 4 pencils = 1 pencil
5 sixths − 4 sixths = 1 sixth

In subtracting fractions having like denominators, subtract only the numerators.

2. Irene is sewing lace on two pillow slips for her doll's bed. She will have to sew $\frac{3}{4}$ yard of lace on the two slips. She has already sewed $\frac{1}{4}$ yard. How much lace does she still have to sew?

$$\begin{array}{l} \frac{3}{4} \\ \frac{1}{4} \\ \hline \frac{2}{4} = \frac{1}{2} \end{array}$$

Why should you change the $\frac{2}{4}$ to $\frac{1}{2}$?

Always remember to reduce the answer to lowest terms.

Subtract. Which answers do you need to reduce?

3.

$\frac{7}{8}$	$\frac{2}{3}$	$\frac{7}{9}$	$\frac{11}{12}$	$\frac{4}{6}$	$\frac{6}{7}$	$\frac{9}{10}$
$\frac{1}{8}$	$\frac{1}{3}$	$\frac{2}{9}$	$\frac{5}{12}$	$\frac{1}{6}$	$\frac{3}{7}$	$\frac{3}{10}$
$\frac{4}{5}$	$\frac{6}{7}$	$\frac{7}{8}$	$\frac{5}{9}$	$\frac{5}{6}$	$\frac{3}{5}$	$\frac{7}{12}$
$\frac{2}{5}$	$\frac{4}{7}$	$\frac{3}{8}$	$\frac{2}{9}$	$\frac{1}{6}$	$\frac{1}{5}$	$\frac{3}{12}$

AT HOME AND AT THE BANK

1. On Saturday Henry dug 4 bushels of potatoes. On Monday after school he dug $\frac{1}{2}$ bushel. How many bushels did he dig in the two days? $4+\frac{1}{2}=?$ Write the sum as a mixed number.

2. On Monday after school Joseph practiced on his violin $\frac{3}{4}$ hour. On Tuesday after school he practiced 1 hour. How long did he practice in two days? $\frac{3}{4}+1=?$ Write the sum as a mixed number.

3. Tom had 75¢, or $\frac{3}{4}$ of a dollar, and his uncle gave him 2 dollars for his birthday. Tom put all the money in the bank the next day. How much did he put in the bank? Write the sum as a mixed number.

4. John had $3\frac{1}{2}$ dollars in the bank. On Tuesday morning he put in $\frac{1}{2}$ dollar more. How much did he then have in the bank?

Add these whole numbers, mixed numbers, and fractions. What kind of number is each sum?

5.	$\begin{array}{r}3\\ \underline{2\frac{2}{5}}\end{array}$	$\begin{array}{r}8\\ \underline{2\frac{2}{3}}\end{array}$	$\begin{array}{r}5\frac{1}{7}\\ \underline{7\phantom{\frac{1}{7}}}\end{array}$	$\begin{array}{r}7\frac{1}{9}\\ \underline{4\phantom{\frac{1}{9}}}\end{array}$	$\begin{array}{r}6\frac{1}{3}\\ \underline{\frac{1}{3}}\end{array}$	$\begin{array}{r}5\frac{1}{5}\\ \underline{\frac{1}{5}}\end{array}$
6.	$\begin{array}{r}4\\ \underline{3\frac{3}{4}}\end{array}$	$\begin{array}{r}9\\ \underline{5\frac{1}{2}}\end{array}$	$\begin{array}{r}6\frac{3}{8}\\ \underline{6\phantom{\frac{3}{8}}}\end{array}$	$\begin{array}{r}8\frac{3}{5}\\ \underline{5\phantom{\frac{3}{5}}}\end{array}$	$\begin{array}{r}7\frac{1}{7}\\ \underline{\frac{1}{7}}\end{array}$	$\begin{array}{r}5\frac{1}{9}\\ \underline{\frac{1}{9}}\end{array}$
7.	$\begin{array}{r}9\\ \underline{3\frac{1}{3}}\end{array}$	$\begin{array}{r}8\frac{2}{5}\\ \underline{4\phantom{\frac{2}{5}}}\end{array}$	$\begin{array}{r}7\\ \underline{1\frac{3}{7}}\end{array}$	$\begin{array}{r}6\frac{1}{4}\\ \underline{5\frac{2}{4}}\end{array}$	$\begin{array}{r}2\frac{1}{2}\\ \underline{5\phantom{\frac{1}{2}}}\end{array}$	$\begin{array}{r}8\frac{1}{3}\\ \underline{\frac{1}{3}}\end{array}$

More Whole Numbers, Mixed Numbers, and Fractions to Add

$$\begin{array}{l} 5\frac{3}{8} \\ \underline{\ \ \frac{3}{8}} \\ 5\frac{6}{8} = 5\frac{3}{4} \end{array}$$

1. Bob cut a piece of board $5\frac{3}{8}$ inches long to use in making his birdhouse. When he tried to fit it in, he found the piece was $\frac{3}{8}$ inch too short. How long should he have cut the board? $5\frac{3}{8} + \frac{3}{8} = ?$

Sometimes in adding mixed numbers we get an improper fraction in the sum equal to a whole number.

$$\begin{array}{r} 3\frac{1}{4} \\ \underline{6\frac{3}{4}} \\ 10 \end{array}$$

2. $3\frac{1}{4} + 6\frac{3}{4} = ?$

Think: $\frac{1}{4}$ and $\frac{3}{4} = \frac{4}{4} = 1$. Add the 1 to the whole numbers. 1 and 3 are 4, and 6 are 10.

The sum is 10.

Sometimes in adding mixed numbers we get an improper fraction in the sum equal to a mixed number.

3. $4\frac{4}{5} + 3\frac{2}{5} = ?$

$$\begin{array}{r} 4\frac{4}{5} \\ \underline{3\frac{2}{5}} \\ 8\frac{1}{5} \end{array}$$

Think: $\frac{4}{5}$ and $\frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$. Write $\frac{1}{5}$ under the fractions. Add the 1 to the whole numbers. 1 and 4 are 5, and 3 are 8.

The sum is $8\frac{1}{5}$.

Try to get the correct sums in these examples:

4.	$3\frac{1}{2}$ $\underline{2\frac{1}{2}}$	$4\frac{3}{4}$ $\underline{5\frac{1}{4}}$	$3\frac{5}{8}$ $\underline{6\frac{3}{8}}$	$2\frac{2}{3}$ $\underline{6\frac{1}{3}}$	$2\frac{1}{6}$ $\underline{5\frac{5}{6}}$	$3\frac{4}{7}$ $\underline{4\frac{3}{7}}$
5.	$8\frac{3}{5}$ $\underline{2\frac{3}{5}}$	$4\frac{5}{12}$ $\underline{6\frac{11}{12}}$	$3\frac{4}{9}$ $\underline{5\frac{8}{9}}$	$7\frac{4}{9}$ $\underline{4\frac{7}{9}}$	$5\frac{6}{7}$ $\underline{2\frac{3}{7}}$	$4\frac{7}{8}$ $\underline{8\frac{3}{8}}$

RICHARD AT SUMMER CAMP

1. Richard spent four weeks in a Boy Scout camp. The scouts hiked on Wednesdays. The first week they went $3\frac{5}{8}$ miles, and the second week $4\frac{7}{8}$ miles. How far did they hike altogether?

2. Tuesday was woodcraft day in the camp and the scouts followed trails through the woods. Richard's group followed a trail $2\frac{3}{4}$ miles the first Tuesday. The next week they followed a trail $1\frac{3}{4}$ miles. How far did they go on the trails the first two weeks?

3. Friday was baseball day. The boys had four teams. Richard's team played ball $2\frac{1}{4}$ hours the first Friday and $1\frac{3}{4}$ hours the second Friday. How many hours did his team play on these two days?

4. Monday, Thursday, and Saturday were rowing days. Roger Stone, Richard's tentmate, made the best record. The first week his average distance each day was $\frac{3}{4}$ mile; the second week, $1\frac{1}{4}$ miles; the third week, $1\frac{4}{5}$ miles; the fourth week, $2\frac{1}{5}$ miles. He was allowed to use the best two of his weekly records to get his final average. What was it?

AT THE LACE COUNTER

1. A clerk sold $\frac{1}{4}$ yard of lace from a bolt that had in it $7\frac{3}{4}$ yards. How many yards of lace were left in the bolt? $7\frac{3}{4}-\frac{1}{4}=?$

$$\boxed{\begin{array}{l} 7\frac{3}{4} \\ \underline{\ \ \frac{1}{4}} \\ 7\frac{2}{4}=7\frac{1}{2} \end{array}}$$

Subtract: $\frac{1}{4}$ from $\frac{3}{4}=\frac{2}{4}$
Write the $\frac{2}{4}$ under the fractions.
There is nothing to subtract from 7.
Write the 7 at the left of the $\frac{2}{4}$.
The remainder is $7\frac{2}{4}$.
$7\frac{2}{4}=7\frac{1}{2}$, the number of yards left.

2. From another bolt of lace that had in it $5\frac{5}{6}$ yards, the clerk sold $\frac{5}{6}$ yard. How many yards of lace were left in the bolt? $5\frac{5}{6}-\frac{5}{6}=?$

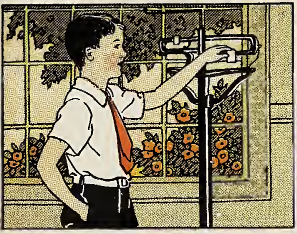
$$\boxed{\begin{array}{l} 5\frac{5}{6} \\ \underline{\ \ \frac{5}{6}} \\ 5 \end{array}}$$

Subtract: $\frac{5}{6}$ from $\frac{5}{6}=0$. You have nothing to write in the answer under the fractions.
There is nothing to subtract from the whole number, 5. Write 5 in the answer.
The remainder is 5.
There were 5 yards left.

Subtract in the following examples.

3.	$8\frac{1}{2}$	$10\frac{7}{9}$	$7\frac{3}{4}$	$11\frac{5}{8}$	$6\frac{9}{10}$	$9\frac{3}{5}$
	$\frac{1}{2}$	$\frac{4}{9}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{7}{10}$	$\frac{2}{5}$
4.	$7\frac{1}{6}$	$5\frac{5}{8}$	$6\frac{8}{9}$	$5\frac{2}{3}$	$11\frac{4}{7}$	$8\frac{3}{4}$
	$\frac{1}{6}$	$2\frac{1}{8}$	$2\frac{2}{9}$	3	5	$5\frac{1}{4}$
5.	$8\frac{1}{2}$	$12\frac{1}{8}$	$9\frac{6}{7}$	$7\frac{7}{10}$	$2\frac{1}{4}$	$8\frac{7}{12}$
	8	$6\frac{1}{8}$	$3\frac{1}{7}$	$4\frac{1}{10}$	$1\frac{1}{4}$	$3\frac{1}{12}$

GETTING WEIGHED AT SCHOOL



1. All of the children at Waverly school were weighed last week. Billy found that he was 9 pounds underweight. He gained $\frac{1}{4}$ pound this week. How many more pounds must Billy gain to be up to weight? $9-\frac{1}{4}=?$

$$\begin{array}{r|r} 9 & 9\frac{4}{4} \\ \underline{\frac{1}{4}} & \underline{(1)\frac{1}{4}} \\ & 8\frac{3}{4} \end{array}$$

You cannot subtract $\frac{1}{4}$ from no fourths. Add $\frac{4}{4}$ above and 1 below, as shown.

Subtract: $\frac{1}{4}$ from $\frac{4}{4}=\frac{3}{4}$ 1 from $9=8$

The remainder is $8\frac{3}{4}$.

Billy must gain $8\frac{3}{4}$ pounds more.

Adding equal amounts, like $\frac{4}{4}$ or 1, to both minuend and subtrahend, does not change the remainder.

2. Warren had been 8 pounds underweight and gained 2 pounds, 6 ounces, or $2\frac{3}{8}$ lb. How much more must he gain to be up to weight? $8-2\frac{3}{8}=?$

$$\begin{array}{r|r} 8 & 8\frac{8}{8} \\ \underline{2\frac{3}{8}} & \underline{3\frac{3}{8}} \\ & 5\frac{5}{8} \end{array}$$

You cannot subtract $\frac{3}{8}$ from no eighths. Add $\frac{8}{8}$ above and 1 below.

Subtract: $\frac{3}{8}$ from $\frac{8}{8}=\frac{5}{8}$ 3 from $8=5$

The remainder is $5\frac{5}{8}$.

Warren must gain $5\frac{5}{8}$ pounds.

3. Billy's sister Ann was only 1 pound underweight. She has gained $\frac{1}{2}$ pound this week. How much more must she gain before she weighs exactly what she ought to weigh? Show how you would work this problem on paper.

4. Robert was 4 pounds underweight. He has gained $1\frac{5}{8}$ pounds this week. How much more must he gain to be the right weight? Show your work.

5. Ann's playmate Lois was 7 pounds underweight. Lois has gained $1\frac{3}{4}$ pounds this week. How much must she gain to be up to weight? Show your work.

6. December has 31 days. Paul is trying to find how long it will be before his birthday on New Year's day. If $7\frac{1}{2}$ days of December have already passed, how many more days will there be before Paul's birthday?

7. Nancy is 9 years old and her sister Jean is $5\frac{1}{2}$. How much older is Nancy than Jean?

8. Clark owes the hardware store 7 dollars for some tools that he bought. If he pays $4\frac{3}{4}$ dollars today, how much will he still owe?

Subtract.

9.	6	10	4	8	11
	$\frac{1}{3}$	$5\frac{3}{7}$	$\frac{1}{5}$	$2\frac{2}{3}$	$4\frac{3}{8}$
10.	7	9	6	5	7
	$3\frac{1}{9}$	$4\frac{3}{5}$	$3\frac{5}{6}$	$\frac{7}{8}$	$2\frac{4}{5}$

Subtracting Fractions and Mixed Numbers from Mixed Numbers

MRS. ANDREWS AT THE STORE

1. Mrs. Andrews wanted to buy $1\frac{1}{8}$ yards of green silk. At Dawson's Department Store she found a remnant of green silk which was only $\frac{7}{8}$ yard long. How much too short was the remnant? $1\frac{1}{8}-\frac{7}{8}=?$

$$\begin{array}{r|r} 1\frac{1}{8} & 1\ \frac{9}{8} \\ \underline{\frac{7}{8}} & \underline{(1)\frac{7}{8}} \\ & \frac{2}{8}=\frac{1}{4} \end{array}$$

You cannot subtract $\frac{7}{8}$ from $\frac{1}{8}$. Add $\frac{8}{8}$ above and 1 below, as you did before.

Subtract: $\frac{7}{8}$ from $\frac{9}{8}=\frac{2}{8}=\frac{1}{4}$
1 from $1=0$

The remnant was $\frac{1}{4}$ yard too short.

2. Tom is going on his bicycle to see his grandmother. Her home is $8\frac{2}{5}$ miles from Tom's home. When Tom gets to road 12, he has gone $2\frac{4}{5}$ miles. How far is he then from his grandmother's home? $8\frac{2}{5}-2\frac{4}{5}=?$

$$\begin{array}{r|r} 8\frac{2}{5} & 8\frac{7}{5} \\ \underline{2\frac{4}{5}} & \underline{3\frac{4}{5}} \\ & 5\frac{3}{5} \end{array}$$

Add one unit above and one unit below. You can now subtract.

Subtract: $\frac{4}{5}$ from $\frac{7}{5}=\frac{3}{5}$
3 from $8=5$

When Tom gets to road 12, he is $5\frac{3}{5}$ miles from his grandmother's home.

Subtract:

3. $2\frac{1}{4}-\frac{3}{4}$ $\quad$ $5\frac{3}{6}-3\frac{1}{6}$ $\quad$ $3\frac{2}{7}-1\frac{5}{7}$

FINDING OUR WEAK SPOTS

If you have any weak spots in adding fractions, this test will help you find them. Write the examples on your paper. Number each exercise as in the test. Your teacher will sometimes have you do part of an example out loud to find your weak spot.

1. Add:

$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{7}{10}$
$\underline{\frac{1}{5}}$	$\underline{\frac{1}{3}}$	$\underline{\frac{2}{7}}$	$\underline{\frac{3}{8}}$	$\underline{\frac{5}{8}}$	$\underline{\frac{1}{10}}$
$\frac{2}{3}$	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{5}{12}$
$\underline{\frac{1}{3}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{1}{8}}$	$\underline{\frac{2}{3}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{1}{12}}$
4	5	$4\frac{1}{7}$	1	$3\frac{1}{2}$	$6\frac{3}{4}$
$\underline{\frac{1}{3}}$	$\underline{1\frac{3}{5}}$	$\underline{\frac{1}{7}}$	$\underline{3\frac{1}{6}}$	$\underline{4\frac{1}{2}}$	$\underline{4\frac{3}{4}}$

2. Subtract:

$\frac{3}{5}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{3}{4}$
$\underline{\frac{2}{5}}$	$\underline{\frac{1}{3}}$	$\underline{\frac{2}{5}}$	$\underline{\frac{3}{6}}$	$\underline{\frac{1}{8}}$	$\underline{\frac{1}{4}}$
$5\frac{4}{7}$	$8\frac{3}{8}$	$6\frac{3}{4}$	$6\frac{2}{3}$	$8\frac{1}{2}$	$4\frac{1}{5}$
$\underline{\frac{1}{7}}$	$\underline{\frac{1}{8}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{1}{3}}$	$\underline{7}$	$\underline{2}$
8	5	1	$7\frac{1}{7}$	$8\frac{2}{5}$	$11\frac{2}{9}$
$\underline{\frac{1}{3}}$	$\underline{2\frac{3}{4}}$	$\underline{\frac{2}{3}}$	$\underline{\frac{4}{7}}$	$\underline{7\frac{4}{5}}$	$\underline{4\frac{4}{9}}$

If you made mistakes in any of these exercises, do the exercise of the same number on the next page. Then try that part of the test again.

CURING OUR WEAK SPOTS

1. Add:

$\begin{array}{r}\frac{2}{5}\\ \frac{2}{5}\\ \hline\end{array}$	$\begin{array}{r}\frac{1}{9}\\ \frac{4}{9}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{7}\\ \frac{2}{7}\\ \hline\end{array}$	$\begin{array}{r}\frac{1}{4}\\ \frac{1}{4}\\ \hline\end{array}$	$\begin{array}{r}\frac{1}{8}\\ \frac{3}{8}\\ \hline\end{array}$	$\begin{array}{r}\frac{5}{12}\\ \frac{3}{12}\\ \hline\end{array}$
$\begin{array}{r}\frac{1}{2}\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{5}\\ \frac{2}{5}\\ \hline\end{array}$	$\begin{array}{r}\frac{4}{7}\\ \frac{3}{7}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{5}\\ \frac{3}{5}\\ \hline\end{array}$	$\begin{array}{r}\frac{2}{4}\\ \frac{3}{4}\\ \hline\end{array}$	$\begin{array}{r}\frac{7}{8}\\ \frac{5}{8}\\ \hline\end{array}$
$\begin{array}{r}2\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}4\\ 1\frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}4\frac{1}{5}\\ \frac{1}{5}\\ \hline\end{array}$	$\begin{array}{r}\frac{1}{4}\\ 3\frac{1}{4}\\ \hline\end{array}$	$\begin{array}{r}2\frac{3}{5}\\ 2\frac{2}{5}\\ \hline\end{array}$	$\begin{array}{r}1\frac{7}{10}\\ 6\frac{1}{10}\\ \hline\end{array}$
$\begin{array}{r}4\frac{1}{7}\\ 1\frac{1}{7}\\ \hline\end{array}$	$\begin{array}{r}7\frac{3}{4}\\ 4\frac{3}{4}\\ \hline\end{array}$	$\begin{array}{r}5\\ 6\frac{1}{6}\\ \hline\end{array}$	$\begin{array}{r}6\\ 3\frac{3}{5}\\ \hline\end{array}$	$\begin{array}{r}6\frac{2}{3}\\ 3\frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}8\frac{5}{12}\\ 4\frac{1}{12}\\ \hline\end{array}$

2. Subtract:

$\begin{array}{r}\frac{2}{3}\\ \frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}\frac{4}{7}\\ \frac{2}{7}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{5}\\ \frac{2}{5}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{8}\\ \frac{1}{8}\\ \hline\end{array}$	$\begin{array}{r}\frac{5}{10}\\ \frac{1}{10}\\ \hline\end{array}$	$\begin{array}{r}\frac{4}{12}\\ \frac{2}{12}\\ \hline\end{array}$
$\begin{array}{r}6\frac{5}{8}\\ \frac{2}{8}\\ \hline\end{array}$	$\begin{array}{r}9\frac{3}{4}\\ \frac{1}{4}\\ \hline\end{array}$	$\begin{array}{r}7\frac{7}{8}\\ \frac{7}{8}\\ \hline\end{array}$	$\begin{array}{r}4\frac{2}{5}\\ 3\frac{1}{5}\\ \hline\end{array}$	$\begin{array}{r}3\frac{1}{3}\\ 3\\ \hline\end{array}$	$\begin{array}{r}8\frac{1}{2}\\ 2\\ \hline\end{array}$
$\begin{array}{r}6\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}4\\ 2\frac{1}{4}\\ \hline\end{array}$	$\begin{array}{r}1\\ \frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}6\frac{1}{3}\\ \frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}9\frac{1}{8}\\ 8\frac{3}{8}\\ \hline\end{array}$	$\begin{array}{r}10\frac{1}{5}\\ 5\frac{2}{5}\\ \hline\end{array}$
$\begin{array}{r}7\\ 2\frac{3}{4}\\ \hline\end{array}$	$\begin{array}{r}7\frac{2}{5}\\ 6\frac{4}{5}\\ \hline\end{array}$	$\begin{array}{r}13\frac{4}{9}\\ 2\frac{2}{9}\\ \hline\end{array}$	$\begin{array}{r}5\frac{4}{7}\\ \frac{1}{7}\\ \hline\end{array}$	$\begin{array}{r}4\frac{1}{5}\\ 2\\ \hline\end{array}$	$\begin{array}{r}10\frac{1}{3}\\ \frac{2}{3}\\ \hline\end{array}$

CHAPTER IV

DOING HARDER WORK IN FRACTIONS

How to Add Fractions Having Unlike Denominators

1. Dorothy had a half-dollar and her uncle gave her a quarter of a dollar. What part of a dollar did she have then? Think: $\frac{1}{2}=\frac{2}{4}$. $\frac{2}{4}+\frac{1}{4}=?$

2. Helen's mother baked an apple pie. The family ate $\frac{1}{2}$ of it at dinner. The next day Helen's father took $\frac{1}{8}$ of the pie with him for lunch. How much of the pie was used then?

In this problem the denominators are not alike. One denominator is halves and the other is eighths. To add $\frac{1}{2}$ and $\frac{1}{8}$ you must change them to the **same denominator.**

$$\boxed{\begin{array}{r} \frac{1}{2}=\frac{4}{8} \\ \frac{1}{8}=\frac{1}{8} \\ \hline \frac{5}{8} \end{array}}$$

← Change $\frac{1}{2}$ to $\frac{4}{8}$.

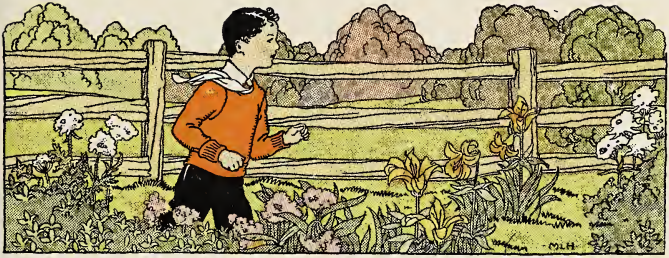
← Add: $\frac{4}{8}+\frac{1}{8}=\frac{5}{8}$

Remember that in adding fractions you add only the numerators.

3. Give the right numerator.

To add $\frac{1}{5}$ and $\frac{1}{10}$, change the $\frac{1}{5}$ to $\frac{\quad}{10}$.
To add $\frac{1}{3}$ and $\frac{1}{9}$, change the $\frac{1}{3}$ to $\frac{\quad}{9}$.
To add $\frac{2}{3}$ and $\frac{1}{6}$, change the $\frac{2}{3}$ to $\frac{\quad}{6}$.
To add $\frac{1}{4}$ and $\frac{1}{12}$, change the $\frac{1}{4}$ to $\frac{\quad}{12}$.

To add fractions with unlike denominators, first make the denominators alike.



TOM AND HAZEL HELP MOTHER

1. Tom helps his mother by doing errands for her. On Monday he walked $\frac{5}{8}$ mile when doing an errand, on Tuesday he walked $\frac{1}{4}$ mile, and on Wednesday he walked $\frac{1}{8}$ mile. How far did he walk in doing the three errands? $\frac{5}{8}+\frac{1}{4}+\frac{1}{8}=?$

To add fractions with unlike denominators, first make the denominators alike.

$\frac{5}{8}=\frac{5}{8}$

$\frac{1}{4}=\frac{2}{8}$ ← Change $\frac{1}{4}$ to $\frac{2}{8}$.

$\frac{1}{8}=\frac{1}{8}$ ← Now all the denominators are eighths.

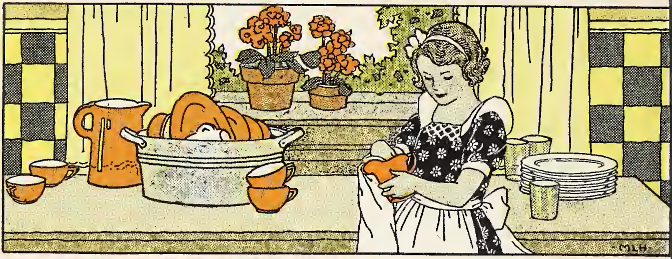
$\frac{8}{8}=1$ ← Add: $\frac{5}{8}+\frac{2}{8}+\frac{1}{8}=1$

Tom walked 1 mile in doing the three errands.

In the problem above, the $\frac{1}{4}$ was changed to $\frac{2}{8}$. This made all the denominators in the fractions alike. The denominator in each was 8. We call this denominator the **common denominator**.

2. To add $\frac{1}{2}$ and $\frac{5}{6}$, change $\frac{1}{2}$ to $\frac{\ }{6}$.

3. To add $\frac{3}{4}$ and $\frac{1}{8}$, change $\frac{3}{4}$ to $\frac{\ }{8}$.



4. Tom's sister Hazel helps her mother by washing the dishes each morning. It took her $\frac{1}{2}$ hour on Monday morning and $\frac{1}{4}$ hour on Tuesday morning. How long did it take Hazel to wash the dishes for the two days? $\frac{1}{2}+\frac{1}{4}=\ ?$

$$\boxed{\begin{array}{r} \frac{1}{2}=\frac{2}{4} \\ \frac{1}{4}=\underline{\frac{1}{4}} \\ \frac{3}{4} \end{array}}$$

←Change $\frac{1}{2}$ to $\frac{2}{4}$.

←Add: $\frac{2}{4}+\frac{1}{4}=\frac{3}{4}$

It took Hazel $\frac{3}{4}$ hour to wash the dishes on Monday and Tuesday.

5. In adding $\frac{1}{3}$ and $\frac{1}{6}$ in the problem above, a common denominator was used. What was the common denominator?

6. In adding $\frac{1}{2}$ and $\frac{1}{3}$ what common denominator would you use? Add them.

The common denominator of two or more fractions is a number that can be divided by each of the denominators without a remainder. If one of the denominators can be divided by each of the others, it is the common denominator.

In many problems it is easy to look at the denominators of the fractions and think of a number that can be divided by each of them without leaving a remainder.

1. Grace and her parents took an automobile trip. Monday they went $\frac{1}{5}$ of the whole trip and Tuesday they went $\frac{1}{3}$ of it. What part of the trip did Grace and her parents cover in the two days? $\frac{1}{5}+\frac{1}{3}=?$

Look at the denominators 5 and 3, and tell what number can be divided by each of them without leaving a remainder. It is best to take the smallest number that you can take. What is the smallest number?

If you cannot think of the smallest number, you can find a common denominator by multiplying the denominators in the problem together. $5 \times 3 = ?$

Change each of the two fractions to a fraction having 15 for its denominator. Then add the numerators.

$\frac{1}{5}=\frac{3}{15}$	← Change $\frac{1}{5}$ to $\frac{3}{15}$.
$\frac{1}{3}=\frac{5}{15}$	← Change $\frac{1}{3}$ to $\frac{5}{15}$.
$\frac{8}{15}$	← Add: $\frac{3}{15}+\frac{5}{15}=\frac{8}{15}$

Grace and her parents traveled $\frac{8}{15}$ of the distance in the first two days.

You can find a common denominator of two or more fractions by multiplying their denominators together.

Changing fractions to other fractions of equal value will help you in finding common denominators.

Say the missing numerators.

2. $\frac{1}{2}=\frac{}{6}$	**3.** $\frac{3}{5}=\frac{}{20}$	**4.** $\frac{1}{4}=\frac{}{16}$	**5.** $\frac{3}{4}=\frac{}{24}$
$\frac{1}{4}=\frac{}{8}$	$\frac{3}{4}=\frac{}{8}$	$\frac{3}{5}=\frac{}{10}$	$\frac{2}{3}=\frac{}{9}$
$\frac{2}{3}=\frac{}{6}$	$\frac{2}{3}=\frac{}{15}$	$\frac{4}{6}=\frac{}{12}$	$\frac{2}{4}=\frac{}{12}$
$\frac{3}{4}=\frac{}{12}$	$\frac{2}{7}=\frac{}{21}$	$\frac{4}{7}=\frac{}{14}$	$\frac{2}{5}=\frac{}{15}$
$\frac{1}{7}=\frac{}{14}$	$\frac{2}{3}=\frac{}{12}$	$\frac{1}{12}=\frac{}{24}$	$\frac{3}{4}=\frac{}{16}$
$\frac{4}{5}=\frac{}{20}$	$\frac{3}{8}=\frac{}{16}$	$\frac{2}{3}=\frac{}{18}$	$\frac{5}{6}=\frac{}{18}$
$\frac{2}{9}=\frac{}{18}$	$\frac{3}{4}=\frac{}{20}$	$\frac{5}{6}=\frac{}{12}$	$\frac{5}{8}=\frac{}{16}$

6. Monday morning Tom worked in his father's store $\frac{1}{4}$ hour, Wednesday morning $\frac{1}{2}$ hour, and Friday morning, $\frac{1}{5}$ hour. How long did he work on the three mornings? $\frac{1}{4}+\frac{1}{2}+\frac{1}{5}=?$

Find a common denominator for these three fractions. What number can be evenly divided by 4 and 2 and 5? Multiply the denominators of the three fractions: $4\times2\times5=40$.

$$\frac{1}{4}=\frac{10}{40}$$
$$\frac{1}{2}=\frac{20}{40}$$
$$\frac{1}{5}=\frac{8}{40}$$
$$\frac{38}{40}=\frac{19}{20}$$

Change $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{1}{5}$ to fractions having 40 for a denominator.
Then add the numerators.
The sum is $\frac{38}{40}$. When changed to simpler form, it is $\frac{19}{20}$.

Tom worked $\frac{19}{20}$ of an hour on the three mornings.

7. A common denominator for $\frac{1}{2}$ and $\frac{1}{5}$ is ___.

8. A common denominator for $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{5}$ is ___.

9. A common denominator for $\frac{1}{3}$ and $\frac{1}{7}$ is ___.

RALPH AND BOB VISIT JIM

1. Ralph and Bob hiked to the country to see their cousin Jim. In the afternoon Ralph, Bob, and Jim went fishing. Ralph caught a fish weighing $\frac{1}{2}$ pound. Bob caught one weighing $\frac{3}{4}$ pound, and Jim caught one weighing $\frac{7}{8}$ pound. How many pounds did all 3 fish weigh? $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}=?$

Find a common denominator, a number that can be divided evenly by 2, 4, and 8. What is it?

Add the fractions in this way:

$$\begin{array}{l} \frac{1}{2}=\frac{4}{8} \\ \frac{3}{4}=\frac{6}{8} \\ \frac{7}{8}=\underline{\frac{7}{8}} \\ \qquad \frac{17}{8}=2\frac{1}{8} \end{array}$$

Change the fractions to the common denominator.
Add the numerators.
The sum is $2\frac{1}{8}$.
The 3 fish weighed $2\frac{1}{8}$ pounds.

Add these fractions.

2.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{4}{6}$	$\frac{1}{5}$
	$\frac{5}{12}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{2}{3}$
	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$
3.	$\frac{2}{5}$	$\frac{1}{9}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{2}{6}$
	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{1}{4}$

MARIE PRACTICES ON THE PIANO

$$\begin{aligned} \tfrac{5}{6} &= \tfrac{5}{6} \\ \tfrac{1}{2} &= \tfrac{3}{6} \\ \tfrac{1}{3} &= \underline{\tfrac{2}{6}} \\ & \quad \tfrac{10}{6} = 1\tfrac{4}{6} = 1\tfrac{2}{3} \end{aligned}$$

1. Marie will play the piano at a music recital Thursday afternoon. Monday she practiced $\frac{5}{6}$ hour; Tuesday, $\frac{1}{2}$ hour; and Wednesday, $\frac{1}{3}$ hour. How long did she practice in the three days? $\frac{5}{6}+\frac{1}{2}+\frac{1}{3}=?$

In adding fractions with unlike denominators we sometimes get a fraction that has to be changed to lowest terms. In the example about Marie the answer is $1\frac{4}{6}$. It must be changed to $1\frac{2}{3}$. In adding fractions, always see that the sum is in **lowest terms**.

Find the sums. Change your answers to lowest terms.

2.	$\frac{1}{2}$ $\frac{5}{6}$	$\frac{3}{4}$ $\frac{1}{2}$	$\frac{5}{6}$ $\frac{5}{12}$	$\frac{7}{8}$ $\frac{1}{2}$	$\frac{1}{2}$ $\frac{7}{10}$
3.	$\frac{1}{6}$ $\frac{1}{3}$ $\frac{3}{4}$	$\frac{3}{5}$ $\frac{1}{2}$ $\frac{1}{10}$	$\frac{1}{2}$ $\frac{1}{6}$ $\frac{2}{3}$	$\frac{8}{15}$ $\frac{3}{5}$ $\frac{2}{3}$	$\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{6}$
4.	$\frac{4}{5}$ $\frac{3}{4}$ $\frac{1}{20}$	$\frac{2}{3}$ $\frac{3}{4}$ $\frac{1}{12}$	$\frac{5}{6}$ $\frac{1}{2}$ $\frac{2}{3}$	$\frac{3}{8}$ $\frac{1}{4}$ $\frac{5}{8}$	$\frac{3}{10}$ $\frac{1}{2}$ $\frac{4}{5}$
5.	$\frac{3}{8}$ $\frac{1}{4}$ $\frac{1}{2}$	$\frac{2}{3}$ $\frac{4}{5}$ $\frac{6}{15}$	$\frac{1}{6}$ $\frac{3}{8}$ $\frac{1}{4}$	$\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{10}$	$\frac{4}{9}$ $\frac{2}{3}$ $\frac{1}{6}$

DURING THE LIBRARY PERIOD

1. Alice and her brother Donald are both reading *Hans Brinker* during their library period at school. Alice reads faster than Donald. She has read $\frac{1}{3}$ of the book, and Donald has read $\frac{1}{6}$ of the book. How much more has Alice read than Donald? $\frac{1}{3}-\frac{1}{6}=?$

$$\boxed{\begin{array}{r} \frac{1}{3}=\frac{2}{6} \\ \underline{\frac{1}{6}}=\frac{1}{6} \\ \hline \frac{1}{6} \end{array}}$$

Find the smallest common denominator. The smallest or least common denominator of 3 and 6 is 6.
Change the fractions so that you can subtract. $\frac{1}{3}=\frac{2}{6}$ $\frac{1}{6}=\frac{1}{6}$
Subtract. Remember to subtract only the numerators. $\frac{1}{6}$ from $\frac{2}{6}=\frac{1}{6}$
Alice has read $\frac{1}{6}$ more than Donald.

2. Helen and her friend, Dot, are both reading *Heidi*. Helen has read $\frac{3}{4}$ of the book, and Dot has read $\frac{2}{3}$ of the book. How much more has Helen read than Dot?

$$\boxed{\begin{array}{l} \frac{5}{12}= \\ \underline{\frac{1}{4}}= \\ \\ \end{array}}$$

3. Subtract $\frac{1}{4}$ from $\frac{5}{12}$. You will have to do something in this example that you did not have to do in those above. Watch to see what it is.

Subtract.

4.	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{5}{9}$	$\frac{4}{5}$	$\frac{1}{4}$	$\frac{9}{16}$
	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{8}$
5.	$\frac{7}{10}$	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{9}{10}$	$\frac{7}{9}$	$\frac{7}{16}$
	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{5}$	$\frac{2}{3}$	$\frac{1}{4}$

Adding Mixed Numbers Having Unlike Fractions

CAMP FIRE GIRLS

1. Helen and Mary are Camp Fire Girls. One Friday after school their group took a hike of $3\frac{3}{4}$ miles, and on Saturday morning they took another hike of $4\frac{3}{8}$ miles. How far did each girl walk on the two hikes? $3\frac{3}{4}+4\frac{3}{8}=?$

$$\begin{array}{r} 3\frac{3}{4}=3\frac{6}{8} \\ \underline{4\frac{3}{8}}=\underline{4\frac{3}{8}} \\ 8\frac{1}{8} \end{array}$$

Look at $\frac{3}{4}$ and $\frac{3}{8}$ and tell what is the least common denominator. It is 8.
Change the fractions to eighths.
Add: $\frac{6}{8}+\frac{3}{8}=\frac{9}{8}=1\frac{1}{8}$. Write $\frac{1}{8}$ under the fractions. Add 1 to the whole numbers.
Add: 1 and 3 are 4, and 4 are 8.
Each girl walked $8\frac{1}{8}$ miles.

2. Each of the girls is making a headband. Last week Helen completed $8\frac{5}{8}$ inches of her headband, and the week before she made $7\frac{1}{2}$ inches. How many inches did she make in the two weeks?

3. Mary has been working on her headband for three weeks. The first week she made $5\frac{3}{8}$ inches; the second week, $4\frac{1}{2}$ inches; the third week, $8\frac{3}{4}$ inches. How many inches did she make in the three weeks?

4. Each girl wants to make a middy out of the same material. Mary needs $2\frac{3}{8}$ yards and Helen needs $2\frac{3}{4}$ yards. How many yards do they both need?

THE RELAY RACE

1. Two boys at Lincoln school are preparing to run a 100-yard relay race against two boys at Washington school. Each boy has to run 50 yards. The two teams practice every afternoon after school. Here are the records of the two teams on Monday. Which team did better on that day?

Lincoln school		Washington school	
John	$9\frac{2}{5}$ seconds	Ralph	$10\frac{7}{10}$ seconds
Harris	$10\frac{1}{10}$ seconds	Henry	$9\frac{4}{5}$ seconds

2. Here are their records for Tuesday. Which team did better on that day?

Lincoln school		Washington school	
John	$9\frac{1}{5}$ seconds	Ralph	$10\frac{1}{2}$ seconds
Harris	$10\frac{7}{10}$ seconds	Henry	$9\frac{1}{5}$ seconds

3. Which team did better on Wednesday?

Lincoln school		Washington school	
John	$8\frac{4}{5}$ seconds	Ralph	$10\frac{1}{5}$ seconds
Harris	10 seconds	Henry	$8\frac{4}{5}$ seconds

Add.

1.	$\begin{array}{r} 6\frac{2}{3} \\ 4\frac{1}{2} \\ 3\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{1}{5} \\ 2\frac{1}{3} \\ 4\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{3}{8} \\ 4\frac{1}{3} \\ 2\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{1}{6} \\ 4\frac{2}{3} \\ 3\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{4}{7} \\ 2\frac{1}{2} \\ \hline \end{array}$
2.	$\begin{array}{r} 8\frac{2}{9} \\ 4\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{4}{5} \\ 8\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{8} \\ 4\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{6} \\ 11\frac{2}{3} \\ 8\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 11\frac{2}{5} \\ 4\frac{1}{4} \\ 8\frac{1}{10} \\ \hline \end{array}$
3.	$\begin{array}{r} 7\frac{1}{12} \\ 8\frac{1}{6} \\ 5\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{1}{2} \\ 4\frac{2}{3} \\ 6\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{3} \\ 2\frac{5}{6} \\ 3\frac{4}{9} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{1}{6} \\ 4\frac{1}{2} \\ 5\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{3}{8} \\ 2\frac{1}{4} \\ 4\frac{1}{2} \\ \hline \end{array}$
4.	$\begin{array}{r} 12\frac{1}{5} \\ 4\frac{1}{10} \\ 6\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{1}{5} \\ 6\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{8} \\ 4\frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} 5\frac{1}{2} \\ 9\frac{9}{16} \\ \hline \end{array}$	$\begin{array}{r} 13\frac{5}{6} \\ 8\frac{1}{3} \\ \hline \end{array}$

Often Useful

We often have to change a fraction to make its denominator 100. Change the following fractions to make 100 the denominator of each.

5. $\frac{1}{2} = \frac{\quad}{100}$ $\frac{1}{4} = \frac{\quad}{100}$ $\frac{3}{4} = \frac{\quad}{100}$

6. $\frac{1}{5} = \frac{\quad}{100}$ $\frac{2}{5} = \frac{\quad}{100}$ $\frac{3}{5} = \frac{\quad}{100}$

7. $\frac{1}{10} = \frac{\quad}{100}$ $\frac{5}{10} = \frac{\quad}{100}$ $\frac{8}{10} = \frac{\quad}{100}$

Add.

8. $\frac{1}{2} + \frac{1}{4} = \frac{\quad}{100}$ $\frac{3}{4} + \frac{1}{4} = \frac{\quad}{100}$ $\frac{1}{5} + \frac{3}{5} = \frac{\quad}{100}$

9. $\frac{4}{5} + \frac{1}{5} = \frac{\quad}{100}$ $\frac{1}{10} + \frac{4}{10} = \frac{\quad}{100}$ $\frac{2}{10} + \frac{5}{10} = \frac{\quad}{100}$

LOSING GOLF BALLS

1. Mr. Johnson's store is near the Woodland Hills Golf Course. On the day the course opened, he had 43 golf balls, or $3\frac{7}{12}$ dozen balls, in stock. He sold 15 balls, or $1\frac{1}{4}$ dozen, that morning. How many dozen were left in stock? $3\frac{7}{12} - 1\frac{1}{4} = ?$

Find the least common denominator. It is 12.

$$\begin{array}{rl} 3\frac{7}{12} = & 3\frac{7}{12} \\ \underline{1\frac{1}{4}} = & \underline{1\frac{3}{12}} \\ & 2\frac{4}{12} = 2\frac{1}{3} \end{array}$$

Change the fractions so that you can subtract. $\frac{7}{12} = \frac{7}{12}$ $\frac{1}{4} = \frac{3}{12}$
Subtract: $\frac{3}{12}$ from $\frac{7}{12} = \frac{4}{12}$
1 from $3 = 2$
The remainder is $2\frac{4}{12}$.
$\frac{4}{12} = \frac{1}{3}$

Mr. Johnson had $2\frac{1}{3}$ dozen of the golf balls left.

Subtract.

2.	$4\frac{5}{6}$	$8\frac{7}{8}$	$9\frac{11}{12}$	$7\frac{4}{5}$	$9\frac{1}{2}$	$11\frac{5}{8}$
	$4\frac{1}{3}$	$2\frac{1}{4}$	$5\frac{1}{6}$	$3\frac{2}{3}$	$9\frac{1}{5}$	$3\frac{1}{2}$
3.	$5\frac{2}{5}$	$10\frac{2}{3}$	$8\frac{5}{6}$	$6\frac{11}{12}$	$8\frac{1}{2}$	$9\frac{3}{4}$
	$5\frac{2}{5}$	$4\frac{1}{8}$	$2\frac{1}{4}$	$5\frac{1}{4}$	$8\frac{1}{3}$	$4\frac{1}{2}$
4.	$11\frac{4}{5}$	$7\frac{7}{8}$	$10\frac{3}{5}$	$8\frac{7}{9}$	$4\frac{6}{7}$	$5\frac{7}{10}$
	$8\frac{3}{4}$	$4\frac{5}{6}$	$5\frac{1}{5}$	$5\frac{1}{3}$	$2\frac{1}{2}$	$2\frac{1}{5}$
5.	$9\frac{3}{4}$	$7\frac{9}{10}$	$6\frac{2}{3}$	$8\frac{2}{9}$	$11\frac{3}{5}$	$9\frac{4}{7}$
	$5\frac{2}{3}$	$3\frac{1}{4}$	$4\frac{1}{6}$	$6\frac{2}{9}$	$8\frac{1}{3}$	$3\frac{1}{3}$
6.	$14\frac{7}{8}$	$8\frac{9}{10}$	$4\frac{5}{6}$	$7\frac{4}{5}$	$10\frac{8}{9}$	$16\frac{3}{5}$
	$3\frac{2}{3}$	$4\frac{3}{4}$	$2\frac{1}{8}$	$3\frac{1}{6}$	$5\frac{1}{3}$	$4\frac{1}{4}$

JOSEPHINE'S SCHOOL

1. Josephine has moved to a new house. Her father finds that if she attends the Harrison school she will have to walk $2\frac{1}{8}$ miles each day, and that if she attends the Roosevelt school she will have to walk $1\frac{5}{8}$ miles each day. How much less will she have to walk if she attends the Roosevelt school? $2\frac{1}{8}-1\frac{5}{8}=?$

$2\frac{1}{8}$	$2\frac{9}{8}$
$1\frac{5}{8}$	$2\frac{5}{8}$
	$\frac{4}{8}=\frac{1}{2}$

You cannot subtract $\frac{5}{8}$ from $\frac{1}{8}$. Add one unit above and one below, as you have done before.
Subtract: $\frac{5}{8}$ from $\frac{9}{8}=\frac{4}{8}$
2 from $2=0$
The difference is $\frac{4}{8}$. $\frac{4}{8}=\frac{1}{2}$

Josephine will have $\frac{1}{2}$ mile less to walk each day.

Subtract.

2.	$3\frac{1}{4}$	$6\frac{2}{7}$	$8\frac{4}{9}$	$10\frac{1}{3}$	$7\frac{2}{5}$
	$1\frac{3}{4}$	$4\frac{4}{7}$	$6\frac{7}{9}$	$8\frac{2}{3}$	$4\frac{4}{5}$
3.	$8\frac{1}{6}$	$12\frac{3}{8}$	$5\frac{3}{10}$	$9\frac{1}{8}$	$6\frac{1}{12}$
	$4\frac{5}{6}$	$9\frac{5}{8}$	$3\frac{7}{10}$	$4\frac{3}{8}$	$4\frac{5}{12}$
4.	$7\frac{1}{5}$	$8\frac{3}{8}$	$11\frac{1}{9}$	$10\frac{7}{12}$	$5\frac{5}{16}$
	$5\frac{2}{5}$	$5\frac{7}{8}$	$8\frac{5}{9}$	$8\frac{11}{12}$	$3\frac{9}{16}$
5.	$8\frac{1}{7}$	$10\frac{5}{8}$	$11\frac{2}{5}$	$7\frac{4}{7}$	$9\frac{7}{10}$
	$4\frac{5}{7}$	$3\frac{7}{8}$	$4\frac{3}{5}$	$3\frac{6}{7}$	$5\frac{9}{10}$

EUGENE EARNS EGG MONEY

1. Eugene's father keeps chickens. When Eugene takes care of the chickens, he is allowed to sell the eggs that his mother does not need. He is saving the egg money to buy a new suit of clothes.

Last week Eugene gathered $4\frac{1}{6}$ dozen eggs, and his mother used $2\frac{2}{3}$ dozen of them. How many dozen did Eugene have left to sell? $4\frac{1}{6} - 2\frac{2}{3} = ?$

$4\frac{1}{6} = 4\frac{1}{6}$	$4\frac{7}{6}$
$\underline{2\frac{2}{3}} = \underline{2\frac{4}{6}}$	$\underline{3\frac{4}{6}}$
	$1\frac{3}{6} = 1\frac{1}{2}$

Find a common denominator.
Change the fractions to this denominator. $\frac{1}{6} = \frac{1}{6}$ $\quad \frac{2}{3} = \frac{4}{6}$
You cannot subtract $\frac{4}{6}$ from $\frac{1}{6}$. Add one unit above and one below.
Subtract: $\frac{4}{6}$ from $\frac{7}{6} = \frac{3}{6}$ $\quad$ 3 from $4 = 1$
The difference is $1\frac{1}{2}$.
Eugene had $1\frac{1}{2}$ dozen eggs left to sell.

2. This week Eugene gathered $4\frac{1}{3}$ dozen eggs, and his mother used $1\frac{3}{4}$ dozen. How many dozen does Eugene have left?

Find the difference.

3.	$5\frac{1}{5}$	$1\frac{1}{8}$	$2\frac{3}{4}$	$8\frac{1}{6}$	$8\frac{1}{2}$
	$\frac{2}{3}$	$\frac{2}{3}$	$1\frac{7}{8}$	$7\frac{1}{2}$	$2\frac{4}{5}$
4.	$3\frac{1}{6}$	$7\frac{2}{3}$	$4\frac{1}{4}$	$8\frac{1}{3}$	$6\frac{1}{5}$
	$1\frac{1}{4}$	$\frac{5}{6}$	$\frac{3}{5}$	$4\frac{5}{9}$	$2\frac{3}{10}$
5.	$9\frac{1}{6}$	$5\frac{1}{5}$	$10\frac{5}{12}$	$6\frac{1}{4}$	$8\frac{3}{8}$
	$4\frac{3}{8}$	$2\frac{1}{2}$	$8\frac{3}{4}$	$3\frac{2}{5}$	$1\frac{3}{4}$

A MAGIC SQUARE

1. The square below is called a magic square, for the answers to all the rows and all the columns of fractions are exactly the same.

$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{2}{8}$	$\frac{1}{8}$

When you add the fractions in the left-hand column, you get $\frac{7}{8}$. Adding the fractions in the middle column gives $\frac{7}{8}$, and adding the fractions in the right-hand column also brings an answer of $\frac{7}{8}$. When you add the fractions in the top row, you get $\frac{7}{8}$. Adding the fractions in the middle row gives $\frac{7}{8}$, and adding the fractions in the bottom row gives $\frac{7}{8}$.

One of the following squares is not a magic square. Find which it is.

2.

$\frac{1}{5}$	$\frac{3}{10}$	$\frac{3}{10}$
$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{10}$
$\frac{1}{10}$	$\frac{3}{10}$	$\frac{2}{5}$

3.

$\frac{3}{12}$	$\frac{1}{4}$	$\frac{7}{12}$
$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{4}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{12}$

4.

$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{16}$
$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{2}$
$\frac{5}{16}$	$\frac{1}{4}$	$\frac{6}{16}$

5.

$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{12}$
$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$
$\frac{1}{6}$	$\frac{1}{4}$	$\frac{2}{3}$

6.

$\frac{1}{3}$	$\frac{1}{6}$	$\frac{6}{18}$
$\frac{2}{9}$	$\frac{10}{18}$	$\frac{1}{18}$
$\frac{5}{18}$	$\frac{1}{9}$	$\frac{4}{9}$

WHICH OF THE SQUARES ARE NOT MAGIC?

1.

$\frac{2}{5}$	$\frac{1}{4}$	$\frac{2}{5}$
$\frac{3}{10}$	$\frac{7}{10}$	$\frac{1}{20}$
$\frac{7}{20}$	$\frac{2}{10}$	$\frac{3}{5}$

2.

$\frac{1}{2}$	$\frac{4}{8}$	$\frac{3}{8}$
$\frac{1}{8}$	$\frac{3}{4}$	$\frac{1}{2}$
$\frac{3}{4}$	$\frac{1}{8}$	$\frac{3}{8}$

3.

$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{8}$
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{12}$
$\frac{1}{2}$	$\frac{1}{24}$	$\frac{1}{4}$

4.

$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{2}{12}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{6}$
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{5}{12}$
$\frac{5}{12}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{3}{4}$

5.

$\frac{3}{10}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{3}{10}$
$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{2}$
$\frac{3}{10}$	$\frac{1}{2}$	$\frac{2}{5}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{2}{5}$

6.

$\frac{1}{4}$	$\frac{7}{12}$	$\frac{3}{12}$	$\frac{1}{3}$
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{4}{12}$
$\frac{1}{3}$	$\frac{3}{12}$	$\frac{1}{3}$	$\frac{1}{2}$
$\frac{4}{12}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{4}$

7.

$\frac{1}{2}$	$\frac{1}{16}$	$\frac{3}{8}$	$\frac{1}{8}$
$\frac{1}{4}$	$\frac{6}{16}$	$\frac{5}{16}$	$\frac{2}{16}$
$\frac{3}{16}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{4}$
$\frac{1}{8}$	$\frac{2}{16}$	$\frac{1}{4}$	$\frac{9}{16}$

8.

$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{2}{3}$
$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{2}$
$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{5}{12}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{1}{12}$

9.

$\frac{5}{18}$	$\frac{1}{6}$	$\frac{4}{9}$	$\frac{1}{9}$
$\frac{2}{9}$	$\frac{10}{18}$	$\frac{1}{18}$	$\frac{1}{6}$
$\frac{1}{3}$	$\frac{1}{6}$	$\frac{6}{18}$	$\frac{3}{18}$
$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{6}$	$\frac{5}{9}$

10.

$\frac{2}{5}$	$\frac{1}{4}$	$\frac{1}{20}$	$\frac{1}{2}$
$\frac{7}{20}$	$\frac{2}{20}$	$\frac{3}{20}$	$\frac{3}{5}$
$\frac{3}{10}$	$\frac{3}{20}$	$\frac{3}{5}$	$\frac{3}{20}$
$\frac{3}{20}$	$\frac{7}{10}$	$\frac{2}{5}$	$\frac{1}{4}$

11.

$\frac{3}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{3}$
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{12}$
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{17}{24}$
$\frac{5}{24}$	$\frac{7}{24}$	$\frac{5}{8}$	$\frac{11}{24}$

12.

$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{4}$
$\frac{1}{5}$	$\frac{1}{4}$	$\frac{3}{10}$	$\frac{6}{20}$
$\frac{1}{4}$	$\frac{1}{10}$	$\frac{1}{2}$	$\frac{1}{5}$
$\frac{1}{10}$	$\frac{3}{5}$	$\frac{1}{20}$	$\frac{3}{10}$

FINDING OUR WEAK SPOTS

If you have any weak spots in adding and subtracting fractions, this test will help to find them. Write the examples on your paper. Number each exercise as in the test. Your teacher will sometimes have you do part of an example out loud to find your weak spots.

1. Add:

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{8}$
$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$
			$\frac{2}{5}$	$\frac{1}{4}$	$\frac{3}{8}$

$3\frac{1}{5}$	$4\frac{3}{4}$	$3\frac{4}{7}$	$6\frac{2}{3}$	$1\frac{3}{7}$	$1\frac{1}{2}$
$2\frac{1}{3}$	$3\frac{1}{3}$	$\frac{2}{3}$	$8\frac{3}{4}$	$\frac{2}{7}$	$2\frac{1}{4}$
			$5\frac{1}{2}$	$3\frac{1}{2}$	$\frac{3}{4}$

2. Subtract:

$\frac{1}{3}$	$6\frac{5}{6}$	$6\frac{1}{3}$	$6\frac{2}{3}$	$9\frac{1}{4}$	$3\frac{1}{8}$
$\frac{1}{6}$	$\frac{1}{3}$	$\frac{5}{6}$	$2\frac{1}{6}$	$7\frac{1}{2}$	$1\frac{1}{4}$

$6\frac{2}{3}$	$10\frac{7}{8}$	$2\frac{1}{6}$	$6\frac{1}{12}$	$4\frac{3}{8}$	$12\frac{3}{4}$
$2\frac{4}{5}$	$10\frac{1}{4}$	$1\frac{1}{3}$	$2\frac{1}{2}$	$1\frac{3}{8}$	$5\frac{4}{5}$

If you made mistakes in any of these exercises, do the exercise of the same number on the next page. Then try that part of the test again.

CURING OUR WEAK SPOTS

1. Add:

$\begin{array}{r}\frac{1}{2}\\ \frac{1}{5}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{8}\\ \frac{1}{8}\\ \hline\end{array}$	$\begin{array}{r}\frac{3}{16}\\ \frac{7}{8}\\ \hline\end{array}$	$\begin{array}{r}\frac{2}{3}\\ \frac{1}{2}\\ \frac{1}{6}\\ \hline\end{array}$	$\begin{array}{r}\frac{5}{12}\\ \frac{2}{3}\\ \frac{1}{6}\\ \hline\end{array}$	$\begin{array}{r}\frac{1}{3}\\ \frac{1}{2}\\ \frac{1}{4}\\ \hline\end{array}$
$\begin{array}{r}8\frac{1}{2}\\ 4\frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}3\frac{3}{4}\\ 8\frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}8\frac{3}{10}\\ \frac{4}{5}\\ \hline\end{array}$	$\begin{array}{r}9\frac{7}{12}\\ 7\frac{1}{4}\\ 5\frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}2\frac{3}{8}\\ \frac{1}{2}\\ 1\frac{5}{8}\\ \hline\end{array}$	$\begin{array}{r}5\frac{1}{3}\\ 2\frac{1}{5}\\ \frac{3}{5}\\ \hline\end{array}$
$\begin{array}{r}3\frac{3}{4}\\ 2\frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}4\frac{4}{7}\\ 3\frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}3\frac{1}{5}\\ \frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}1\frac{1}{2}\\ \frac{1}{4}\\ 3\frac{3}{4}\\ \hline\end{array}$	$\begin{array}{r}1\frac{2}{3}\\ \frac{3}{4}\\ 3\frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}6\frac{3}{7}\\ 8\frac{2}{7}\\ 5\frac{1}{2}\\ \hline\end{array}$

2. Subtract:

$\begin{array}{r}\frac{5}{6}\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}4\frac{1}{2}\\ \frac{1}{4}\\ \hline\end{array}$	$\begin{array}{r}2\frac{1}{4}\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}3\frac{5}{8}\\ 1\frac{1}{4}\\ \hline\end{array}$	$\begin{array}{r}8\frac{1}{3}\\ 2\frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}6\frac{5}{8}\\ 5\frac{3}{4}\\ \hline\end{array}$
$\begin{array}{r}5\frac{1}{2}\\ 3\frac{2}{3}\\ \hline\end{array}$	$\begin{array}{r}5\frac{3}{4}\\ 5\frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}1\frac{3}{5}\\ \frac{4}{5}\\ \hline\end{array}$	$\begin{array}{r}5\frac{3}{10}\\ 2\frac{3}{5}\\ \hline\end{array}$	$\begin{array}{r}6\frac{1}{5}\\ 2\frac{1}{5}\\ \hline\end{array}$	$\begin{array}{r}33\frac{1}{3}\\ 6\frac{2}{3}\\ \hline\end{array}$
$\begin{array}{r}4\frac{3}{4}\\ 1\frac{4}{5}\\ \hline\end{array}$	$\begin{array}{r}12\frac{2}{3}\\ 5\frac{4}{5}\\ \hline\end{array}$	$\begin{array}{r}6\frac{3}{8}\\ 2\frac{3}{8}\\ \hline\end{array}$	$\begin{array}{r}2\frac{1}{12}\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}10\frac{1}{6}\\ 9\frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}6\frac{7}{8}\\ 2\frac{1}{4}\\ \hline\end{array}$
$\begin{array}{r}5\frac{1}{3}\\ 2\frac{5}{6}\\ \hline\end{array}$	$\begin{array}{r}7\frac{1}{4}\\ \frac{1}{2}\\ \hline\end{array}$	$\begin{array}{r}10\frac{7}{8}\\ 4\frac{3}{4}\\ \hline\end{array}$	$\begin{array}{r}5\frac{2}{3}\\ 1\frac{1}{6}\\ \hline\end{array}$	$\begin{array}{r}9\frac{5}{6}\\ 1\frac{1}{3}\\ \hline\end{array}$	$\begin{array}{r}8\frac{1}{8}\\ 4\frac{1}{4}\\ \hline\end{array}$

LEST YOU FORGET

1. Add:

97	49	27	227	\$192.63
29	37	88	306	957.90
	9	39	60	57.29
				837.50

$\$23.05+\$6.90+\$1.94+\$.96=?$

2. Subtract:

88	383	9085	4506	1000
39	94	577	695	393

$\$9.00-\$.73=?$ $\$7.66-\$1.99=?$

3. Multiply:

71	732	18	490	60
29	376	90	34	75

2002	540	931	4922	736
305	80	800	173	506

4. Divide:

$2\overline{)468}$ $8\overline{)992}$ $4\overline{)\$124.08}$ $218\overline{)12890}$

$27\overline{)1620}$ $39\overline{)31590}$ $25\overline{)10025}$ $129\overline{)103458}$

WINNERS' PAGE
For the pupils who made no mistakes in the tests on pages 160 and 162.

In each problem, ask yourself:
(a) What is to be found?
(b) What does the problem tell me?
(c) What should I do to solve the problem?

Then solve and check.

1. Mr. Daley weighs $185\frac{1}{2}$ lb. Bill Daley weighs $75\frac{1}{4}$ lb., Ruby weighs $55\frac{1}{4}$ lb., and little Dick weighs $35\frac{3}{4}$ lb. How much more does Mr. Daley weigh than his children?

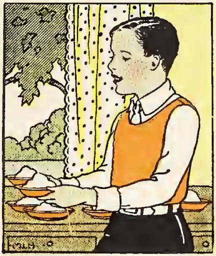
2. It is a long journey to the house of Harold's grandmother. First, there is a train ride of $5\frac{3}{4}$ hours and then a boat trip of $8\frac{3}{4}$ hours. Then there is a bus ride of $\frac{1}{2}$ an hour. How many hours does this journey take?

3. Mrs. Keller serves orange juice for breakfast each morning. Last week she bought oranges three times. The first time she bought $1\frac{1}{2}$ doz., the second time she bought $1\frac{1}{2}$ doz., and the third time she bought 2 doz. How many dozen oranges did she buy for her family last week?

4. Mr. Clayton walks $\frac{1}{2}$ mile to the bus each morning, and $\frac{1}{4}$ mile from the bus to his office. He walks the same distances going home each evening. How far does Mr. Clayton walk each day?

5. Jerry worked at home $\frac{1}{2}$ hour before school. He spent $\frac{1}{4}$ hour going to school and was in school __ hours. In doing these three things Jerry spent $5\frac{1}{2}$ hours. How many hours was he in school?

ICE CREAM FOR ROBERT'S PARTY



1. Robert is having a birthday party. He wants to serve one-half pint of ice cream to each of his guests and to himself. There will be 10 boys, counting himself, at the party. How many pints of ice cream should Robert buy for the party?

$10 \times \frac{1}{2} = ?$

$10 \times \frac{1}{2} = \frac{10}{2} = 5$	← One way
$10 \times \frac{1}{2} = \frac{10 \times 1}{2} = \frac{10}{2} = 5$	← Another way

Robert should buy 5 pints.

To multiply a fraction by a whole number, multiply the numerator of the fraction by the whole number and then divide the product by the denominator of the fraction.

2. Hazel is making 9 handkerchiefs for Christmas gifts. If she buys $\frac{1}{4}$ yard linen for each, how much linen should she buy for all 9 handkerchiefs?

$9 \times \frac{1}{4} = \frac{9}{4}$ $\qquad \frac{9}{4} = 2\frac{1}{4}$

Multiply.

3.	$6 \times \frac{1}{3} =$	$8 \times \frac{1}{3} =$	$14 \times \frac{1}{4} =$	$4 \times \frac{2}{15} =$
4.	$8 \times \frac{1}{4} =$	$11 \times \frac{1}{2} =$	$12 \times \frac{1}{8} =$	$2 \times \frac{2}{5} =$
5.	$12 \times \frac{1}{2} =$	$15 \times \frac{1}{4} =$	$10 \times \frac{1}{6} =$	$4 \times \frac{2}{15} =$
6.	$15 \times \frac{1}{3} =$	$13 \times \frac{1}{2} =$	$18 \times \frac{1}{4} =$	$3 \times \frac{2}{15} =$
7.	$14 \times \frac{1}{2} =$	$17 \times \frac{1}{4} =$	$20 \times \frac{1}{8} =$	$4 \times \frac{3}{16} =$

APPLES AND CANDY FOR EACH

1. Ted has 10 apples to give to 5 boys. How many apples should each boy get? $10 \div 5 = 2$

There is another way of solving this problem. Each boy would get $\frac{1}{5}$ of the 10 apples. $\frac{1}{5}$ of 10 means $\frac{1}{5} \times 10$.

$\frac{1}{5} \times 10 = \frac{10}{5}$	← Multiply: $\frac{1}{5} \times 10 = 2$
$\frac{10}{5} = 10 \div 5 = 2$	← Each boy should get 2 apples.

You see you get the same answer in this new fractional way as you do when you divide.

2. Hazel has 14 candy bars to give equally to 4 girls. What should be the share of 1 girl? Of 3 girls together? $\frac{1}{4}$ of $14 = ?$ $\frac{3}{4}$ of $14 = ?$

$\frac{1}{4} \times 14 = 3\frac{1}{2}$	← One girl's share should be $3\frac{1}{2}$ bars.

$\frac{3}{4} \times 14 = \frac{3 \times 14}{4}$ $\frac{3 \times 14}{4} = \frac{42}{4} = 10\frac{1}{2}$	← The share of 3 girls together should be $\frac{3}{4} \times 14$ bars of candy, or $10\frac{1}{2}$ bars.

To multiply a whole number by a fraction, multiply the whole number by the numerator of the fraction and then divide the product by the denominator of the fraction.

THE LAST DAY OF SCHOOL

1. The sixth grade in Washington school is having a party on the last day of school. John's mother is planning to make 32 cup custards for the party. She needs $\frac{3}{4}$ cup of milk for each custard. How many cups of milk will she need for 32 custards?

2. How many pupils in each grade have not been absent this month?

Grade	Pupils in the grade	Part not absent during the month
5A	36	$\frac{5}{6}$
5B	45	$\frac{4}{5}$
4A	35	$\frac{4}{5}$
4B	40	$\frac{7}{8}$
3A	30	$\frac{9}{10}$
3B	44	$\frac{3}{4}$
2A	32	$\frac{7}{8}$
2B	40	$\frac{9}{10}$
1A	35	$\frac{5}{7}$
1B	36	$\frac{8}{9}$
Kindergarten	42	$\frac{6}{7}$

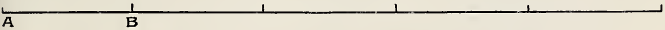
Find the products.

3. $\frac{1}{2}$ of $10 =$	$\frac{1}{4} \times 20 =$	$\frac{1}{5} \times 15 =$
4. $\frac{1}{2}$ of $2 =$	$\frac{3}{9}$ of $2 =$	$\frac{3}{11}$ of $3 =$
5. $\frac{2}{3} \times 11 =$	$\frac{3}{5} \times 9 =$	$\frac{2}{9}$ of $15 =$
6. $\frac{5}{6}$ of $16 =$	$\frac{5}{8} \times 14 =$	$\frac{5}{12} \times 18 =$

Learning to Multiply a Fraction by a Fraction

JOHN'S AUTO TRIP

1. John and his parents are taking an automobile trip. The distance from their starting point, A, to the place where they wish to make their first overnight stop, B, is $\frac{1}{5}$ of the whole distance that they are to travel.



By noon they have covered $\frac{1}{2}$ of the distance from A to B. What part of the whole trip have they covered? $\frac{1}{2}$ of $\frac{1}{5} = ?$

$$\frac{1}{2} \text{ of } \frac{1}{5} = \frac{1}{2} \times \frac{1}{5}$$
$$\frac{1}{2} \times \frac{1}{5} = \frac{1 \times 1}{2 \times 5} = \frac{1}{10}$$

Change "of" to "×."
Multiply numerators: $1 \times 1 = 1$
Multiply denominators: $2 \times 5 = 10$
They traveled $\frac{1}{10}$ of the whole distance.

To multiply two fractions, first multiply the numerators and then multiply the denominators. The product of the numerators will be the numerator in the answer, and the product of the denominators will be the denominator in the answer.

Multiply.

2. $\frac{1}{3} \times \frac{1}{4} =$	$\frac{1}{4}$ of $\frac{1}{2} =$	$\frac{1}{2}$ of $\frac{1}{7} =$
3. $\frac{1}{2} \times \frac{1}{6} =$	$\frac{1}{5} \times \frac{1}{6} =$	$\frac{1}{2} \times \frac{1}{2} =$
4. $\frac{1}{3} \times \frac{1}{6} =$	$\frac{1}{2} \times \frac{1}{8} =$	$\frac{1}{3} \times \frac{1}{3} =$
5. $\frac{1}{2} \times \frac{1}{3} =$	$\frac{1}{8} \times \frac{1}{3} =$	$\frac{1}{3} \times \frac{1}{5} =$

GRACE MAKING PEACH SHORTCAKE

1. Grace wants to make peach shortcake. Her mother says that since this is the first time Grace has tried to make peach shortcake, she must make only one-fourth of a recipe. The recipe calls for $\frac{2}{3}$ of a cup of sugar. How much sugar should Grace use in the shortcake?

$$\boxed{\frac{1}{4}\times\frac{2}{3}=\frac{2}{12}=\frac{1}{6}}$$

To find how much sugar Grace needs, take $\frac{1}{4}$ of $\frac{2}{3}$.

There is a shorter way to work this problem.

$$\boxed{\frac{1}{\underset{2}{\cancel{4}}}\times\frac{\overset{1}{\cancel{2}}}{3}=?}$$

First divide the 2 in the numerator of $\frac{2}{3}$ and the 4 in the denominator of $\frac{1}{4}$ by 2.

$$\boxed{\frac{1}{\underset{2}{\cancel{4}}}\times\frac{\overset{1}{\cancel{2}}}{3}=\frac{1\times1}{2\times3}=\frac{1}{6}}$$

Now multiply the new numerators: $1\times1=1$

Multiply the new denominators: $2\times3=6$

Dividing one numerator and one denominator by the same number is called cancellation.

2. Here are some examples that have been worked by **cancellation**. What number was used in each example in dividing a numerator and a denominator?

(a) $\frac{1}{\underset{1}{\cancel{3}}}\times\frac{\overset{1}{\cancel{3}}}{8}=\frac{1}{8}$	(b) $\frac{5}{\underset{2}{\cancel{6}}}\times\frac{\overset{1}{\cancel{3}}}{4}=\frac{5}{8}$	(c) $\frac{\overset{1}{\cancel{2}}}{3}\times\frac{5}{\underset{4}{\cancel{8}}}=\frac{5}{12}$
(d) $\frac{1}{\underset{1}{\cancel{4}}}$ of $\frac{\overset{2}{\cancel{8}}}{8}=\frac{2}{8}$	(e) $\frac{2}{\underset{1}{\cancel{5}}}\times\frac{\overset{2}{\cancel{10}}}{15}=\frac{4}{15}$	(f) $\frac{\overset{1}{\cancel{5}}}{8}\times\frac{3}{\underset{2}{\cancel{10}}}=\frac{3}{16}$

3. John has $\frac{3}{4}$ of an hour for study. If he spends $\frac{2}{3}$ of the time on his arithmetic lesson, what part of an hour does he spend on his arithmetic? Use cancellation in working this problem.

$\frac{2}{3}$ of $\frac{3}{4}=?$

$\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}}\times\frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{4}}}=\frac{1}{2}$

Divide the numerator of $\frac{2}{3}$ and the denominator of $\frac{3}{4}$ by 2.
Divide the denominator of $\frac{2}{3}$ and the numerator of $\frac{3}{4}$ by 3.
Multiply the new numerators: $1\times1=1$ $\quad 1\times2=2$
The product is $\frac{1}{2}$.

Make a picture of a clock face on your paper to show that $\frac{2}{3}$ of $\frac{3}{4}$ of an hour equals $\frac{1}{2}$ hour.

4. $\frac{1}{5}\times\frac{5}{6}=$	7. $\frac{2}{3}\times\frac{6}{7}=$	10. $\frac{5}{6}\times\frac{3}{8}=$
5. $\frac{1}{4}\times\frac{12}{15}=$	8. $\frac{7}{8}\times\frac{4}{5}=$	11. $\frac{3}{4}\times\frac{4}{7}=$
6. $\frac{1}{2}\times\frac{4}{5}=$	9. $\frac{3}{5}\times\frac{4}{9}=$	12. $\frac{2}{5}\times\frac{3}{4}=$

HAROLD'S STAMP COLLECTION

1. Harold has pasted 24, or $\frac{8}{9}$, of all his stamps in a book. Three-fourths of those in the book are foreign. He has no other foreign stamps. What fraction of all his stamps are foreign? $\frac{3}{4} \times \frac{8}{9} = ?$

$$\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}} \times \frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}} = \frac{1 \times 2}{1 \times 3} = \frac{2}{3}$$

To cancel, divide the numerator 3 and the denominator 9 by 3. Then divide the other numerator 8 and the other denominator 4 by 4.

Then multiply.

Two-thirds of Harold's stamps are foreign.

In multiplying fractions, always cancel as much as possible.

2. What number was used in each case in dividing a numerator and a denominator in the following?

$\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{3}{\cancel{9}}}{\underset{5}{\cancel{10}}} = \frac{3}{5}$	$\frac{\overset{1}{\cancel{5}}}{\underset{4}{\cancel{12}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{10}}} = \frac{1}{8}$	$\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\overset{\cancel{3}}{\cancel{9}}}}{\underset{1}{\underset{\cancel{2}}{\cancel{4}}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} = \frac{1}{1} = 1$

In these problems be sure that you have cancelled as much as possible.

3. $\frac{5}{8} \times \frac{4}{10} =$	**7.** $\frac{7}{8} \times \frac{6}{14} =$	**11.** $\frac{11}{12} \times \frac{9}{22} =$
4. $\frac{3}{7} \times \frac{7}{18} =$	**8.** $\frac{3}{8} \times \frac{4}{9} =$	**12.** $\frac{4}{5} \times \frac{15}{16} =$
5. $\frac{2}{5} \times \frac{10}{14} =$	**9.** $\frac{5}{6} \times \frac{8}{15} =$	**13.** $\frac{3}{10} \times \frac{5}{6} =$
6. $\frac{6}{7} \times \frac{7}{9} =$	**10.** $\frac{7}{12} \times \frac{6}{14} =$	**14.** $\frac{9}{10} \times \frac{15}{18} =$

Cancellation saves you the work of changing the answer to lowest terms.

Changing a Mixed Number to an Improper Fraction

1. Helen has made $2\frac{1}{2}$ pints of lemonade. She wants to know how many half-pint glasses this will fill. $2\frac{1}{2} = \frac{}{2}$

How many halves in $2\frac{1}{2}$?
There are 2 halves in 1.
There are 4 halves in 2.
So, $2\frac{1}{2} = \frac{4}{2} + \frac{1}{2} = \frac{5}{2}$.
Helen can fill 5 half-pint glasses.

2. How many half-pint glasses could Helen fill with $4\frac{1}{2}$ pints of lemonade? $4\frac{1}{2} = \frac{}{2}$

How many halves in $4\frac{1}{2}$?
There are $\frac{2}{2}$ in 1.
There are $\frac{8}{2}$ in 4.
So, $4\frac{1}{2} = \frac{8}{2} + \frac{1}{2} = \frac{9}{2}$.
Helen could fill 9 half-pint glasses.

There is a short way to do these examples.

3. Change $2\frac{1}{2}$ to an improper fraction.

$\boxed{2\frac{1}{2} = \frac{2 \times 2 + 1}{2} = \frac{5}{2}}$ Can you tell why this is correct?

4. Now change $4\frac{1}{2}$ to an improper fraction.

To change a mixed number to an improper fraction, multiply the whole number by the denominator and add the numerator to the product. Place this sum over the denominator of the fraction.

JACKSON SCHOOL PLAY

1. The Jackson school is giving a play in which there will be groups of children in costume. Nine boys will be dressed as brownies. It takes $2\frac{1}{2}$ yards of cambric for each brownie costume. How many yards will be needed for all 9 costumes? $9 \times 2\frac{1}{2} = ?$

One Way

$2\frac{1}{2} = 2 \times 2 + 1 = \frac{5}{2}$ ← Change the mixed number to an improper fraction.

$9 \times \frac{5}{2} = \frac{45}{2} = 22\frac{1}{2}$ ← Multiply.

$22\frac{1}{2}$ yards will be needed.

Another Way

$$\begin{array}{r} 2\frac{1}{2} \\ 9 \\ \hline 4\frac{1}{2} \\ 18 \\ \hline 22\frac{1}{2} \end{array}$$

$4\frac{1}{2}$ ← Multiply $\frac{1}{2}$ by 9: $9 \times \frac{1}{2} = 4\frac{1}{2}$

18 ← Multiply 2 by 9: $9 \times 2 = 18$

$22\frac{1}{2}$ ← Add: $4\frac{1}{2} + 18 = 22\frac{1}{2}$

$22\frac{1}{2}$ yards will be needed for all of the brownie costumes.

2. There will be 6 girls dressed as butterflies. Each butterfly costume takes $1\frac{3}{4}$ yards of cheesecloth. How many yards must the school buy for all 6 costumes? Work this problem in two ways.

3. In the flower chorus are six girls dressed as tulips. Each tulip costume takes $1\frac{1}{8}$ yards of cloth. How many yards are needed for all 6 costumes?

4. Seven little boys are to be dressed as frogs. Each frog costume takes $1\frac{3}{4}$ yards of cambric. How many yards must the school buy for the 7 frogs?

Multiply. Cancel, whenever possible.

1. $\frac{3}{4}$ of $12 =$
2. $\frac{5}{6} \times 18 =$
3. $\frac{1}{6}$ of $6 =$
4. $\frac{4}{5} \times 3 =$
5. $\frac{1}{2} \times 10 =$
6. $9 \times \frac{1}{12} =$
7. $10 \times \frac{1}{2} =$
8. $\frac{1}{2}$ of $\frac{1}{3} =$
9. $3 \times \frac{7}{12} =$
10. $5 \times \frac{5}{9} =$
11. $8 \times \frac{1}{4} =$
12. $\frac{1}{3} \times \frac{6}{7} =$
13. $\frac{4}{9} \times \frac{6}{10} =$
14. $\frac{5}{8} \times \frac{2}{15} =$
15. $\frac{3}{4} \times \frac{8}{15} \times \frac{5}{12} =$
16. $8 \times 3\frac{1}{4} =$
17. $12 \times 4\frac{1}{2} =$
18. $6 \times 4\frac{1}{5} =$
19. $3 \times 5\frac{1}{3} =$
20. $7 \times 2\frac{2}{7} =$
21. $4 \times 3\frac{1}{8} =$
22. $6 \times 2\frac{4}{9} =$
23. $5 \times 2\frac{1}{5} =$
24. $9 \times 3\frac{1}{3} =$
25. $6 \times 3\frac{1}{2} \times \frac{2}{3} =$
26. $8 \times 4\frac{1}{4} \times \frac{2}{5} =$
27. $\frac{7}{8} \times 16 =$
28. $\frac{3}{8} \times 24 =$
29. $16 \times \frac{1}{3} =$
30. $\frac{3}{8} \times \frac{4}{12} =$
31. $\frac{5}{6} \times \frac{3}{5} =$
32. $\frac{1}{10} \times \frac{2}{7} =$
33. $\frac{3}{4} \times \frac{2}{3} =$
34. $8 \times 4\frac{3}{4} =$
35. $6 \times 3\frac{5}{6} =$
36. $7 \times 3\frac{2}{3} =$
37. $\frac{3}{5} \times 10 \times 3 =$
38. $\frac{4}{9} \times \frac{3}{4} \times 2\frac{1}{6} =$
39. $2\frac{1}{4} \times 1\frac{1}{2} \times \frac{4}{9} =$
40. $\frac{3}{14} \times 7 =$
41. $\frac{2}{3}$ of $27 =$
42. $\frac{3}{8} \times 5 =$
43. $\frac{1}{9}$ of $9 =$
44. $8 \times \frac{1}{6} =$
45. $4 \times 2\frac{1}{5} =$
46. $8 \times 4\frac{1}{7} =$
47. $5 \times 2\frac{2}{3} =$
48. $\frac{3}{5} \times \frac{20}{21} =$

WRAPPING BIRTHDAY PACKAGES

1. Tom and his sister Lucy have several birthday presents to wrap. They find that they will need $4\frac{1}{2}$ yards of ribbon. Each yard costs 8 cents. How much will the $4\frac{1}{2}$ yards cost? $4\frac{1}{2} \times 8 = ?$

One Way

$$4\frac{1}{2} = \frac{9}{2}$$

← Change the mixed number to an improper fraction.

$$\frac{9}{\cancel{2}_1} \times \frac{\cancel{8}^4}{1} = \frac{9 \times 4}{1 \times 1} = 36$$

← Cancel and multiply.

The ribbon will cost 36 cents.

Another Way

$$\begin{array}{r} 8 \\ \underline{4\frac{1}{2}} \\ 4 \\ \underline{32} \\ 36 \end{array}$$

← Multiply the 8 by the $\frac{1}{2}$. $\frac{1}{2} \times 8 = 4$

← Multiply the two whole numbers. $4 \times 8 = 32$

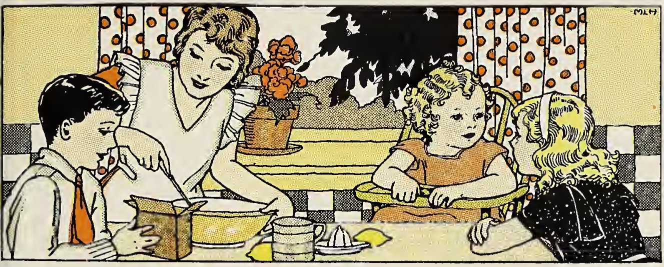
← Add the 4 and the 32. $4 + 32 = 36$

The ribbon will cost 36 cents.

Do you see that both answers are the same?

Work each of the following problems in two ways.

2. $4\frac{1}{3} \times 2 =$
3. $8\frac{1}{5} \times 4 =$
4. $6\frac{3}{4} \times 2 =$
5. $9\frac{2}{3} \times 3 =$
6. $8\frac{2}{5} \times 5 =$
7. $4\frac{1}{2} \times 3 =$
8. $6\frac{5}{6} \times 4 =$
9. $5\frac{2}{3} \times 5 =$
10. $9\frac{3}{5} \times 4 =$
11. $7\frac{1}{6} \times 8 =$
12. $3\frac{2}{9} \times 5 =$
13. $6\frac{3}{7} \times 3 =$
14. $5\frac{4}{5} \times 2 =$
15. $4\frac{3}{8} \times 4 =$
16. $5\frac{1}{8} \times 3 =$
17. $12\frac{1}{2} \times 6 =$
18. $10\frac{1}{3} \times 6 =$
19. $6\frac{1}{4} \times 8 =$
20. $3\frac{1}{6} \times 6 =$
21. $2\frac{3}{4} \times 8 =$
22. $4\frac{1}{2} \times 10 =$



CHANGING A RECIPE FOR FEWER PEOPLE

1. Helen's mother is making fruit ice for lunch. The recipe calls for $1\frac{1}{2}$ teaspoons of gelatine. She wants to make only half the recipe. How much gelatine will she need to use? $\frac{1}{2} \times 1\frac{1}{2} = ?$

$1\frac{1}{2} = \frac{3}{2}$	← Change the mixed number to an improper fraction.
$\frac{1}{2} \times \frac{3}{2} = \frac{1 \times 3}{2 \times 2} = \frac{3}{4}$	← Cancel, if possible, and multiply.

She will need $\frac{3}{4}$ teaspoon of gelatin.

2. Here is a whole recipe. Find out how much Helen's mother will need of each of the other things, except salt, to make half the recipe.

Fruit Ice

$\frac{1}{2}$ cup warm water	2 tablespoons lemon juice
$\frac{1}{2}$ cup sugar	Few grains salt
$1\frac{1}{2}$ teaspoons gelatin	$\frac{2}{3}$ cup cold water
$\frac{2}{3}$ cup fruit juice	

3. Here is a recipe for making oatmeal drop cakes. Suppose you were going to make only half of the recipe. How much of each thing named in the recipe would you need?

Oatmeal Drop Cakes

$\frac{2}{3}$ cup butter	1 teaspoon baking powder
1 cup sugar	$\frac{1}{2}$ teaspoon salt
2 eggs	1 teaspoon cinnamon
1 cup milk	1 teaspoon nutmeg
2 cups rolled oats	1 cup chopped seeded raisins
$2\frac{1}{2}$ cups flour	

In one part of this recipe you have a mixed number. What should you do with $2\frac{1}{2}$ before you multiply it by the fraction $\frac{1}{2}$?

To multiply a mixed number by a fraction, change the mixed number to an improper fraction. Then multiply.

Multiply.

4. $\frac{1}{5} \times 3\frac{1}{3} =$	11. $\frac{4}{9} \times 2\frac{1}{3} =$	18. $\frac{7}{12} \times 3\frac{3}{7} =$
5. $\frac{1}{4}$ of $2\frac{1}{2} =$	12. $\frac{1}{2} \times 4\frac{3}{8} =$	19. $\frac{3}{4} \times 2\frac{2}{9} =$
6. $\frac{1}{6}$ of $2\frac{2}{3} =$	13. $\frac{2}{5} \times 1\frac{5}{6} =$	20. $\frac{1}{6} \times 5\frac{1}{4} =$
7. $\frac{3}{8} \times 2\frac{2}{3} =$	14. $\frac{7}{8} \times 3\frac{1}{3} =$	21. $\frac{2}{9} \times 6\frac{3}{4} =$
8. $\frac{3}{5} \times 8\frac{1}{3} =$	15. $\frac{2}{3} \times 4\frac{1}{2} =$	22. $\frac{3}{8} \times 5\frac{1}{3} =$
9. $\frac{3}{7} \times 1\frac{2}{5} =$	16. $\frac{5}{8} \times 2\frac{2}{15} =$	23. $\frac{5}{9} \times 2\frac{1}{10} =$
10. $\frac{1}{3} \times 4\frac{5}{8} =$	17. $\frac{3}{4} \times 3\frac{2}{9} =$	24. $\frac{6}{7} \times 5\frac{4}{5} =$

INCREASING A RECIPE

1. Mrs. Brown has several guests for breakfast. She has decided to make waffles. The recipe calls for $\frac{1}{4}$ cup of milk. Since she will need to make $2\frac{1}{2}$ times the recipe in order to have enough waffles, how much milk will she need? $2\frac{1}{2} \times \frac{1}{4} = ?$

$2\frac{1}{2} = \frac{5}{2}$	← Change the mixed number to an improper fraction.
$\frac{5}{2} \times \frac{1}{4} = \frac{5}{8}$	← Cancel, if possible, and multiply. Mrs. Brown will need $\frac{5}{8}$ cup of milk.

To multiply a fraction by a mixed number, change the mixed number to an improper fraction. Then multiply.

2. The same guests are staying for lunch. Mrs. Brown is planning to make vegetable soup. Among other things the recipe calls for $\frac{2}{3}$ cupful diced carrot and $\frac{3}{4}$ cupful celery. If she makes $2\frac{1}{2}$ times the recipe, how much diced carrot will she need? How much celery?

Find the products.

3. $2\frac{1}{5} \times \frac{3}{4} =$	**11.** $3\frac{1}{2} \times \frac{5}{7} =$	**19.** $5\frac{2}{3} \times \frac{6}{11} =$
4. $2\frac{1}{4} \times \frac{2}{5} =$	**12.** $1\frac{3}{8} \times \frac{4}{9} =$	**20.** $8\frac{3}{4} \times \frac{2}{7} =$
5. $4\frac{1}{6} \times \frac{3}{5} =$	**13.** $2\frac{3}{4} \times \frac{1}{2} =$	**21.** $6\frac{3}{5} \times \frac{10}{11} =$
6. $6\frac{1}{2} \times \frac{2}{3} =$	**14.** $4\frac{2}{3} \times \frac{6}{7} =$	**22.** $3\frac{3}{8} \times \frac{2}{9} =$
7. $5\frac{1}{7} \times \frac{4}{9} =$	**15.** $6\frac{2}{5} \times \frac{3}{8} =$	**23.** $4\frac{1}{2} \times \frac{5}{18} =$
8. $3\frac{1}{3} \times \frac{1}{2} =$	**16.** $3\frac{1}{8} \times \frac{4}{5} =$	**24.** $2\frac{2}{7} \times \frac{3}{8} =$
9. $4\frac{2}{5} \times \frac{10}{11} =$	**17.** $4\frac{4}{9} \times \frac{3}{10} =$	**25.** $5\frac{5}{8} \times \frac{4}{9} =$
10. $5\frac{1}{3} \times \frac{3}{8} =$	**18.** $3\frac{1}{6} \times \frac{3}{4} =$	**26.** $3\frac{4}{5} \times \frac{5}{6} =$

HOW FAST DOES MARY WRITE?

1. In a writing test Mary can write a sentence $3\frac{1}{2}$ times in one minute. At the same speed, how many times can she write it in $2\frac{1}{2}$ minutes? $2\frac{1}{2}\times 3\frac{1}{2}=?$

$2\frac{1}{2}=\frac{5}{2}$	← Change $2\frac{1}{2}$ to an improper fraction.
$3\frac{1}{2}=\frac{7}{2}$	← Change $3\frac{1}{2}$ to an improper fraction.
$\frac{5}{2}\times\frac{7}{2}=\frac{35}{4}=8\frac{3}{4}$	← Multiply the two improper fractions, cancelling, if possible.

Mary can write $8\frac{3}{4}$ sentences in $2\frac{1}{2}$ minutes.

To multiply a mixed number by a mixed number, change each of the mixed numbers to an improper fraction. Then multiply.

Find the products.

2. $4\frac{1}{3}\times 2\frac{1}{2}=$	6. $4\frac{3}{8}\times 2\frac{2}{5}=$	10. $4\frac{2}{7}\times 1\frac{3}{10}=$
3. $8\frac{3}{4}\times 2\frac{2}{7}=$	7. $7\frac{1}{7}\times 1\frac{2}{5}=$	11. $3\frac{1}{9}\times 1\frac{5}{7}=$
4. $6\frac{2}{3}\times 4\frac{1}{2}=$	8. $3\frac{2}{5}\times 1\frac{1}{9}=$	12. $7\frac{1}{5}\times 2\frac{1}{2}=$
5. $5\frac{3}{5}\times 3\frac{4}{7}=$	9. $8\frac{2}{3}\times 2\frac{1}{4}=$	13. $5\frac{4}{9}\times 2\frac{4}{7}=$

To multiply:

(a) **A mixed number by a whole number ($4\times 3\frac{1}{3}$)**
(b) **A whole number by a mixed number ($2\frac{1}{2}$ by 6)**
(c) **A mixed number by a fraction ($\frac{2}{3}\times 8\frac{1}{4}$)**
(d) **A fraction by a mixed number ($5\frac{2}{3}\times\frac{7}{8}$)**
(e) **A mixed number by a mixed number ($3\frac{5}{8}\times 1\frac{1}{4}$)**

When the numbers are small, change the mixed numbers to improper fractions and multiply.

Multiplying Whole Numbers and Mixed Numbers

1. Mrs. Jones noticed an advertisement in the evening paper in which several articles that she needs are to be sold at reduced prices. Linen towels are advertised at $48\frac{1}{2}$ cents each. She decides to buy 12 of them. How much will she have to pay? $12 \times 48\frac{1}{2}¢ = ?$

When the mixed number is a large number, such as $48\frac{1}{2}$, it is better to work the problem by the method shown below than to change the mixed number to an improper fraction.

$$\begin{array}{r l}
\$\ .48\frac{1}{2} & \\
12 & \\
\hline
6 & \leftarrow \text{Multiply } \tfrac{1}{2} \text{ by 12.} \quad 12 \times \tfrac{1}{2} = 6 \\
96 & \leftarrow \text{Multiply 48 by 2.} \quad \text{Where is 96 placed?} \\
48 & \leftarrow \text{Multiply 48 by 1.} \\
\hline
\$5.82 & \leftarrow \text{Add. Use decimal point in the product. Why?}
\end{array}$$

Mrs. Jones will have to pay $5.82.

2. Hawaiian sliced pineapple is advertised at $16\frac{2}{3}$ cents a can. How much will Mrs. Jones have to pay for 15 cans?

Find the products.

3.	$\begin{array}{r} 42 \\ \underline{4\frac{1}{3}} \end{array}$	$\begin{array}{r} 32\frac{3}{4} \\ \underline{16} \end{array}$	$\begin{array}{r} 20 \\ \underline{18\frac{3}{5}} \end{array}$	$\begin{array}{r} 35\frac{1}{2} \\ \underline{48} \end{array}$
4.	$\begin{array}{r} 51 \\ \underline{19\frac{2}{3}} \end{array}$	$\begin{array}{r} 25 \\ \underline{4\frac{1}{5}} \end{array}$	$\begin{array}{r} 45\frac{3}{8} \\ \underline{16} \end{array}$	$\begin{array}{r} 28 \\ \underline{14\frac{3}{4}} \end{array}$
5.	$\begin{array}{r} 32\frac{1}{4} \\ \underline{16} \end{array}$	$\begin{array}{r} 35 \\ \underline{13\frac{2}{5}} \end{array}$	$\begin{array}{r} 36 \\ \underline{4\frac{1}{9}} \end{array}$	$\begin{array}{r} 48\frac{5}{6} \\ \underline{18} \end{array}$

SELLING POULTRY

1. Bob's father has a poultry ranch. On each Saturday Bob and his father take some of the poultry to town to sell to the different markets. Last Saturday they sold 131 pounds of chickens at $31\frac{3}{4}$ cents a pound. How much should they get for all the chickens? $131 \times 31\frac{3}{4} = ?$

In problems having numbers as large as these, put down the work this way:

$$\begin{array}{r} 131 \\ 31\frac{3}{4} \\ \hline 98\frac{1}{4} \\ 131 \\ 393 \\ \hline 4159\frac{1}{4} \end{array}$$

$$\frac{3}{4} \times 131 = \frac{393}{4} = 98\frac{1}{4}$$

Multiply $\frac{3}{4} \times 131$. Write the product $98\frac{1}{4}$.
Multiply 131 by 1.
Multiply 131 by 3.
Add.

This is a money problem, so write \$ and decimal point in your answer.

They should get \$41.59$\frac{1}{4}$ for all the chickens.

Did they get the $\frac{1}{4}$ cent? No, for we do not have coins so small.

> **If an answer has a fraction less than $\frac{1}{2}$ cent, drop it. If it has a fraction of $\frac{1}{2}$ cent or more, count it as a whole cent.**

2. One week they sold 158 lb. of chickens at $29\frac{1}{2}$¢ a lb. How much did they get that week?

FINDING OUR WEAK SPOTS

If you have any weak spots in multiplying fractions, this test will help to find them. Write the examples on your paper. Number each exercise as in the test. Your teacher will sometimes have you do part of an example out loud to find your weak spot. Multiply.

1. Whole Number by Proper Fraction

$\frac{2}{9} \times 2 =$ $\qquad$ $\frac{1}{4} \times 4 =$ $\qquad$ $\frac{3}{4}$ of $18 =$ $\qquad$ $\frac{3}{8} \times 15 =$

2. Proper Fraction by Whole Number

$3 \times \frac{2}{7} =$ $\qquad$ $3 \times \frac{4}{15} =$ $\qquad$ $6 \times \frac{1}{3} =$ $\qquad$ $14 \times \frac{1}{5} =$

3. Proper Fraction by Proper Fraction

$\frac{5}{12} \times \frac{3}{4} =$ $\qquad$ $\frac{1}{3} \times \frac{6}{7} =$ $\qquad$ $\frac{1}{2}$ of $\frac{1}{3} =$ $\qquad$ $\frac{5}{12} \times \frac{3}{4} \times \frac{1}{2} =$

4. Mixed Number by Whole Number

$5 \times 3\frac{1}{10} =$ $\qquad$ $8 \times 4\frac{5}{6} =$ $\qquad$ $4 \times 3\frac{1}{9} =$ $\qquad$ $6 \times 3\frac{1}{4} \times \frac{5}{6} =$

5. Whole Number by Mixed Number

$4\frac{2}{5} \times 4 =$ $\qquad$ $5\frac{1}{9} \times 3 =$ $\qquad$ $7\frac{2}{5} \times 2 =$ $\qquad$ $4\frac{1}{3} \times 3 =$

6. Mixed Number by Proper Fraction

$\frac{1}{2} \times 3\frac{1}{3} =$ $\qquad$ $\frac{1}{3} \times 1\frac{1}{6} =$ $\qquad$ $\frac{3}{4} \times 7\frac{1}{5} =$ $\qquad$ $\frac{5}{8} \times 4\frac{1}{2} =$

7. Proper Fraction by Mixed Number

$5\frac{2}{3} \times \frac{4}{5} =$ $\qquad$ $8\frac{1}{4} \times \frac{4}{11} =$ $\qquad$ $3\frac{1}{3} \times \frac{3}{5} =$ $\qquad$ $2\frac{1}{5} \times \frac{1}{11} =$

8. Mixed Number by Mixed Number

$3\frac{2}{3} \times 2\frac{1}{2} =$ $\qquad$ $5\frac{2}{5} \times 2\frac{2}{9} =$ $\qquad$ $2\frac{2}{3} \times 2\frac{1}{4} =$ $\qquad$ $5\frac{1}{6} \times 1\frac{1}{11} =$

9. Fractions with Larger Numbers

45	$32\frac{3}{4}$	26	$25\frac{1}{4}$	28
$\underline{4\frac{1}{5}}$	$\underline{8}$	$\underline{16\frac{2}{3}}$	$\underline{18}$	$\underline{12\frac{1}{2}}$

CURING OUR WEAK SPOTS

If you made mistakes in any exercise on page 181, do the exercise of the same number on this page. Then try that part of the test again.

Multiply.

1. Whole Number by Proper Fraction

$\frac{3}{7}\times 2=$ $\frac{1}{3}\times 3=$ $\frac{3}{4}\times 14=$ $\frac{2}{3}\times 16=$

2. Proper Fraction by Whole Number

$2\times\frac{2}{5}=$ $2\times\frac{5}{12}=$ $4\times\frac{1}{2}=$ $20\times\frac{1}{3}=$

3. Proper Fraction by Proper Fraction

$\frac{1}{2}$ of $\frac{1}{3}=$ $\frac{5}{12}\times\frac{3}{4}=$ $\frac{1}{3}\times\frac{6}{7}=$ $\frac{5}{12}\times\frac{3}{4}\times\frac{1}{2}=$

4. Mixed Number by Whole Number

$4\times 4\frac{1}{4}=$ $6\times 3\frac{2}{3}=$ $10\times 7\frac{1}{7}=$ $5\times 3\frac{7}{8}\times\frac{1}{2}=$

5. Whole Number by Mixed Number

$6\frac{2}{3}\times 4=$ $3\frac{1}{8}\times 3=$ $2\frac{1}{6}\times 2=$ $5\frac{1}{4}\times 4=$

6. Mixed Number by Proper Fraction

$\frac{1}{3}\times 2\frac{1}{4}=$ $\frac{1}{4}\times 2\frac{3}{8}=$ $\frac{1}{6}\times 5\frac{1}{3}=$ $\frac{1}{5}\times 2\frac{1}{2}=$

7. Proper Fraction by Mixed Number

$1\frac{1}{3}\times\frac{2}{3}=$ $3\frac{1}{4}\times\frac{7}{8}=$ $2\frac{1}{2}\times\frac{5}{8}=$ $1\frac{1}{5}\times\frac{1}{6}=$

8. Mixed Number by Mixed Number

$1\frac{1}{2}\times 2\frac{1}{3}=$ $3\frac{3}{8}\times 1\frac{1}{2}=$ $4\frac{1}{4}\times 2\frac{1}{4}=$ $6\frac{2}{3}\times 3\frac{3}{4}=$

9. Fractions with Larger Numbers

32	$45\frac{1}{2}$	25	$40\frac{1}{8}$	54
$\underline{3\frac{1}{8}}$	$\underline{6}$	$\underline{12\frac{1}{2}}$	$\underline{16}$	$\underline{18\frac{1}{3}}$

WINNERS' PAGE
For the pupils who made no mistakes on page 181.

MR. SMITH'S CANDY STORE

1. Mr. Smith has a candy store. One week he had a special sale on some of his candy. At the close of each day he wrote down the number of pounds of candy sold during the day. Here is how his record looked:

Candy	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.
Chocolate fudge	$22\frac{1}{4}$	28	$32\frac{1}{2}$	36	$40\frac{1}{2}$	$44\frac{3}{4}$
Caramel fudge	$30\frac{1}{2}$	$26\frac{3}{4}$	$30\frac{3}{4}$	$32\frac{1}{2}$	$36\frac{1}{4}$	$42\frac{1}{2}$
Creams	20	$32\frac{1}{2}$	$36\frac{1}{2}$	$44\frac{1}{4}$	46	$50\frac{1}{2}$
Peanut brittle	$10\frac{3}{4}$	$16\frac{1}{2}$	18	$22\frac{1}{2}$	$20\frac{1}{2}$	$24\frac{1}{4}$
Mixed hard candy	24	32	$40\frac{1}{2}$	48	$50\frac{3}{4}$	$54\frac{1}{2}$
Mints	6	$10\frac{1}{4}$	$14\frac{1}{4}$	$18\frac{3}{4}$	$22\frac{1}{2}$	28

2. Below are the prices a pound at which he sold the candy. How much did he take in during the week from the sale of each kind? From all?

Chocolate fudge,	45¢	Mixed hard candy,	30¢
Caramel fudge,	40¢	Creams,	60¢
Peanut brittle,	25¢	Mints,	55¢

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 30 minutes. Your score will be the number of problems you solve correctly.

Scale		Score
A	Ex.	=9 or 8
B	Good	=7 or 6
C	Fair	=5 or 4
D	Poor	=3 to 0

1. When Mr. Gray has work, he earns 80 cents an hour. On Monday of last week he worked $5\frac{3}{4}$ hours. How much did he earn on that day?

2. If he worked $7\frac{1}{2}$ hours on Tuesday, how much did he earn on Tuesday?

3. On Wednesday he worked $6\frac{3}{4}$ hours; on Thursday, $5\frac{1}{4}$ hours; on Friday, $7\frac{1}{4}$ hours; and on Saturday, $3\frac{1}{2}$ hours. How much did he earn in the four days?

4. What were his earnings for the whole week?

5. If Mr. Gray had received $92\frac{1}{2}$ cents an hour, how much would he have earned in the whole week?

6. Mrs. Gray bought $2\frac{1}{2}$ pounds of butter at 38¢ a pound and 10 pounds of sugar at $5\frac{1}{2}$¢ a pound. How much did these two things cost her?

7. Mrs. Gray also bought $4\frac{3}{4}$ pounds of carrots at 8¢ a pound and 2 cans of peas at $18\frac{1}{2}$¢ a can. Did the carrots and peas together cost more or less than the butter and sugar? How much?

8. When Mrs. Gray paid for the groceries she bought, as shown in problems 6 and 7, she handed the clerk a five-dollar bill. How much change should she receive?

9. As a favor Mrs. Gray asked for her change in quarters. How many quarters should she get?

Dividing a Whole Number by a Fraction

1. Nell has three sticks of candy. She divides each stick into halves. How many pieces does she have then? How many halves are in three whole things? $3 \div \frac{1}{2} = ?$

In one stick of candy there are two halves.
In three sticks there are 3×2 or 6 halves.
Do you see that $3 \div \frac{1}{2} = 3 \times \frac{2}{1} = 6$?

Dividing 3 by $\frac{1}{2}$ comes out the same as multiplying 3 by $\frac{1}{2}$ turned upside down.

2. On a two-mile relay team each boy runs $\frac{1}{8}$ mile. How many boys will be on a team in this race? $2 \div \frac{1}{8} = ?$

There are 8 eighths in 1 mile. There must be 16 eighths in 2 miles.
There will be 16 boys on the team.
Do you see that $2 \div \frac{1}{8} = 2 \times \frac{8}{1} = 16$?

Dividing 2 by $\frac{1}{8}$ comes out the same as multiplying 2 by $\frac{1}{8}$ turned upside down.

3. Mrs. Smith has bought 15 yards of ribbon to wrap Christmas packages. If she uses $\frac{3}{4}$ yard of ribbon for each package, how many packages can she wrap?

$$\boxed{15 \div \frac{3}{4} = \frac{\overset{5}{\cancel{15}}}{1} \times \frac{4}{\underset{1}{\cancel{3}}} = 20}$$

She can wrap 20 packages.

Dividing a Whole Number by a Fraction

Here are the steps for dividing a whole number by a fraction:

> **To divide a whole number by a fraction, invert the divisor, that is, turn it upside down, then multiply.**

4. What is the **inverted** form of each of the following fractions?

$\frac{5}{6}$ $\frac{3}{7}$ $\frac{5}{9}$ $\frac{2}{3}$ $\frac{3}{5}$ $\frac{5}{8}$ $\frac{7}{12}$

5. Bob is in the fifth grade. He goes to a different room for each of his classes. Each class period is $\frac{2}{3}$ hour long. If he spends 4 hours each day in class work, how many classes does he attend during the day?

6. Mr. Green has a restaurant. On Monday for lunch he used seven pies. If he served $\frac{1}{8}$ of a pie with each pie order, how many persons ordered pie?

7. Dick wants to get a bicycle that costs 18 dollars. If he earns $\frac{3}{4}$ dollar every week selling magazines, in how many weeks can he earn enough money to pay for the bicycle?

Divide.

8. $5 \div \frac{1}{4} =$	**13.** $4 \div \frac{2}{5} =$	**18.** $12 \div \frac{2}{3} =$
9. $3 \div \frac{6}{7} =$	**14.** $10 \div \frac{4}{5} =$	**19.** $10 \div \frac{4}{7} =$
10. $7 \div \frac{3}{4} =$	**15.** $16 \div \frac{4}{9} =$	**20.** $4 \div \frac{8}{9} =$
11. $12 \div \frac{8}{9} =$	**16.** $9 \div \frac{2}{5} =$	**21.** $3 \div \frac{1}{3} =$
12. $16 \div \frac{4}{5} =$	**17.** $11 \div \frac{1}{3} =$	**22.** $4 \div \frac{3}{5} =$

THE KINDERGARTEN CHILDREN MAKE CHAINS

1. The children in the kindergarten are making paper chains. For each link they need a strip of paper $\frac{1}{4}$ yard long. How many links can be made from a strip of paper $\frac{6}{8}$ yard long? $\frac{6}{8} \div \frac{1}{4} = ?$

How many fourths are in six-eighths?

$$\frac{6}{8} \div \frac{1}{4} = \frac{\overset{3}{\cancel{6}}}{\underset{\underset{1}{\cancel{2}}}{\cancel{8}}} \times \frac{\overset{1}{\cancel{4}}}{1} = \frac{3}{1} = 3$$

Cancel by dividing 4 and 8 by 4.
Now cancel by dividing 6 and 2 by 2.
Multiply.

Three links can be made from $\frac{6}{8}$ yard of the paper.

To divide a fraction by a fraction, invert the divisor and multiply. Cancel, if possible.

Divide.

2.	$\frac{1}{3} \div \frac{1}{2} =$	$\frac{1}{5} \div \frac{1}{4} =$	$\frac{7}{9} \div \frac{1}{3} =$	$\frac{7}{9} \div \frac{1}{2} =$
3.	$\frac{3}{4} \div \frac{6}{7} =$	$\frac{1}{13} \div \frac{1}{4} =$	$\frac{1}{6} \div \frac{1}{2} =$	$\frac{5}{8} \div \frac{1}{4} =$
4.	$\frac{1}{8} \div \frac{1}{4} =$	$\frac{9}{14} \div \frac{1}{7} =$	$\frac{1}{12} \div \frac{1}{5} =$	$\frac{2}{3} \div \frac{2}{3} =$
5.	$\frac{9}{10} \div \frac{1}{3} =$	$\frac{8}{9} \div \frac{2}{5} =$	$\frac{11}{14} \div \frac{1}{2} =$	$\frac{1}{12} \div \frac{1}{8} =$
6.	$\frac{5}{6} \div \frac{5}{6} =$	$\frac{7}{12} \div \frac{2}{3} =$	$\frac{1}{5} \div \frac{1}{3} =$	$\frac{8}{15} \div \frac{2}{5} =$
7.	$\frac{7}{8} \div \frac{9}{10} =$	$\frac{15}{16} \div \frac{1}{4} =$	$\frac{5}{8} \div \frac{3}{7} =$	$\frac{11}{12} \div \frac{1}{4} =$
8.	$\frac{11}{12} \div \frac{1}{3} =$	$\frac{3}{5} \div \frac{3}{5} =$	$\frac{1}{12} \div \frac{1}{6} =$	$\frac{1}{2} \div \frac{1}{5} =$
9.	$\frac{3}{4} \div \frac{3}{4} =$	$\frac{1}{8} \div \frac{1}{2} =$	$\frac{3}{10} \div \frac{1}{5} =$	$\frac{5}{9} \div \frac{5}{6} =$
10.	$\frac{1}{10} \div \frac{1}{5} =$	$\frac{1}{4} \div \frac{1}{5} =$	$\frac{7}{8} \div \frac{7}{8} =$	$\frac{7}{10} \div \frac{1}{2} =$
11.	$\frac{1}{8} \div \frac{1}{3} =$	$\frac{5}{8} \div \frac{7}{10} =$	$\frac{9}{16} \div \frac{3}{4} =$	$\frac{1}{2} \div \frac{1}{6} =$

TWO DOLLS GET DRESSES

1. Helen is making doll dresses. She has $\frac{5}{6}$ of a yard of cloth. She wants to make two dresses that are just alike. What part of the cloth does she use for one dress? $\frac{5}{6} \div 2 = ?$

	Write the divisor as $\frac{2}{1}$.
$\frac{5}{6} \div \frac{2}{1} = \frac{5}{6} \times \frac{1}{2}$	←Invert the divisor.
$\frac{5}{6} \times \frac{1}{2} = \frac{5}{12}$	←Cancel, if possible, and multiply.

Helen uses $\frac{5}{12}$ of the cloth for one dress.

To divide a fraction by a whole number, write the whole number as a fraction, invert the divisor, and multiply.

2. Mr. Jones has a grocery store. Toward the close of the day he had $\frac{3}{4}$ bushel of potatoes on hand. He sold the $\frac{3}{4}$ bushel to three customers, giving each the same amount. What part of a bushel did each customer get?

$$\frac{3}{4} \div \frac{3}{1} = \frac{\overset{1}{\cancel{3}}}{4} \times \frac{1}{\underset{1}{\cancel{3}}} = \frac{1}{4}$$

Each customer got $\frac{1}{4}$ bushel.

Remember that the 3 means $\frac{3}{1}$ and that when you invert $\frac{3}{1}$ you have $\frac{1}{3}$. Notice that you can cancel in this problem.

Divide.

3. $\frac{1}{4} \div 4 =$	6. $\frac{6}{7} \div 4 =$	9. $\frac{3}{7} \div 3 =$
4. $\frac{3}{8} \div 2 =$	7. $\frac{1}{6} \div 6 =$	10. $\frac{10}{11} \div 5 =$
5. $\frac{5}{7} \div 5 =$	8. $\frac{5}{8} \div 3 =$	11. $\frac{4}{5} \div 2 =$

GOOD CANDY FOR SALE

1. Mr. Little, a candy dealer, made 48 pounds of Easter candy. He put up the candy in $\frac{1}{2}$ pound boxes. How many boxes of Easter candy did he have for sale?

2. Toward the close of a day's business, Mr. Little found that he had $\frac{3}{4}$ pound of peanut brittle that he wished to sell. He put this up in 5-cent bags, each bag containing $\frac{1}{8}$ pound. How many bags of peanut brittle did he have for sale?

Divide.

3. $6 \div \frac{3}{5} =$	13. $\frac{7}{8} \div \frac{5}{6} =$	23. $\frac{5}{16} \div 5 =$
4. $\frac{1}{12} \div \frac{1}{2} =$	14. $\frac{1}{6} \div \frac{1}{3} =$	24. $\frac{1}{2} \div \frac{1}{8} =$
5. $\frac{5}{9} \div 2 =$	15. $14 \div \frac{1}{2} =$	25. $8 \div \frac{1}{3} =$
6. $\frac{1}{10} \div \frac{1}{3} =$	16. $\frac{9}{16} \div \frac{1}{4} =$	26. $\frac{3}{14} \div \frac{1}{2} =$
7. $\frac{3}{7} \div 4 =$	17. $\frac{5}{8} \div \frac{1}{10} =$	27. $9 \div \frac{1}{4} =$
8. $\frac{1}{3} \div \frac{1}{5} =$	18. $\frac{2}{3} \div \frac{8}{9} =$	28. $10 \div \frac{1}{5} =$
9. $8 \div \frac{1}{2} =$	19. $8 \div \frac{1}{4} =$	29. $\frac{4}{7} \div 2 =$
10. $\frac{3}{8} \div 6 =$	20. $\frac{7}{12} \div \frac{1}{2} =$	30. $15 \div \frac{1}{3} =$
11. $\frac{1}{6} \div \frac{1}{3} =$	21. $\frac{5}{7} \div \frac{1}{4} =$	31. $\frac{5}{16} \div \frac{1}{2} =$
12. $9 \div \frac{1}{2} =$	22. $\frac{9}{10} \div 3 =$	32. $\frac{1}{2} \div \frac{1}{4} =$

Dividing a Mixed Number by a Whole Number

PICKING STRAWBERRIES

1. On Saturday 5 boys went to Mr. Jackson's farm to pick strawberries. Together they picked $2\frac{1}{2}$ crates. What is the average amount that each boy picked? $2\frac{1}{2} \div 5 = ?$

$2\frac{1}{2} = \frac{5}{2} \quad 5 = \frac{5}{1}$	←Change both numbers to improper fractions.
$\frac{5}{2} \div \frac{5}{1} = \frac{5}{2} \times \frac{1}{5}$	←Invert the divisor.
$\frac{\overset{1}{\cancel{5}}}{2} \times \frac{1}{\underset{1}{\cancel{5}}} = \frac{1 \times 1}{2 \times 1} = \frac{1}{2}$	←Cancel and multiply. Each boy picked $\frac{1}{2}$ crate of strawberries.

> **To divide a mixed number by a whole number, change both numbers to improper fractions, then invert the divisor and multiply. Cancel, if possible.**

2. On the same Saturday, Mr. Jackson and his two hired men picked $8\frac{1}{4}$ crates of strawberries. What is the average amount that each of the three men picked?

Divide.

3. $2\frac{1}{3} \div 4 =$	**10.** $2\frac{1}{10} \div 7 =$	**17.** $2\frac{5}{8} \div 3 =$
4. $1\frac{1}{4} \div 5 =$	**11.** $1\frac{1}{7} \div 2 =$	**18.** $1\frac{3}{7} \div 5 =$
5. $3\frac{2}{3} \div 2 =$	**12.** $6\frac{3}{5} \div 3 =$	**19.** $4\frac{1}{2} \div 6 =$
6. $6\frac{1}{2} \div 4 =$	**13.** $4\frac{4}{5} \div 8 =$	**20.** $3\frac{1}{5} \div 2 =$
7. $4\frac{1}{6} \div 5 =$	**14.** $1\frac{1}{6} \div 7 =$	**21.** $3\frac{1}{2} \div 7 =$
8. $3\frac{3}{8} \div 3 =$	**15.** $2\frac{2}{5} \div 6 =$	**22.** $4\frac{2}{5} \div 2 =$
9. $1\frac{1}{5} \div 3 =$	**16.** $1\frac{1}{3} \div 8 =$	**23.** $7\frac{5}{7} \div 6 =$

FOOD FOR THE FAMILY

1. Mrs. Burns' family drinks $3\frac{1}{2}$ pints of milk at lunch. Each member of the family drinks $\frac{1}{2}$ pint. How many members are in the family? $3\frac{1}{2} \div \frac{1}{2} = ?$

$3\frac{1}{2} = \frac{7}{2}$	←Change the mixed number to an improper fraction.
$\frac{7}{2} \div \frac{1}{2} = \frac{7}{2} \times \frac{2}{1}$	←Invert the divisor.
$\frac{7}{\cancel{2}_1} \times \frac{\cancel{2}}{1} = \frac{7}{1} = 7$	←Cancel and multiply. There are 7 members in the Burns family.

To divide a mixed number by a fraction, change the mixed number to an improper fraction, then invert the divisor and multiply. Cancel, if possible.

2. Mrs. Burns has $1\frac{1}{2}$ pounds of rice. How many times can she serve rice, if she uses $\frac{1}{4}$ pound each time?

Divide.

3. $2\frac{3}{4} \div \frac{2}{3} =$	12. $1\frac{1}{6} \div \frac{1}{5} =$	21. $3\frac{4}{7} \div \frac{5}{6} =$
4. $1\frac{1}{3} \div \frac{1}{5} =$	13. $1\frac{3}{4} \div \frac{3}{4} =$	22. $1\frac{7}{9} \div \frac{4}{5} =$
5. $3\frac{5}{6} \div \frac{1}{3} =$	14. $3\frac{2}{3} \div \frac{3}{7} =$	23. $2\frac{3}{8} \div \frac{5}{6} =$
6. $5\frac{2}{5} \div \frac{1}{10} =$	15. $3\frac{5}{8} \div \frac{1}{4} =$	24. $5\frac{1}{3} \div \frac{4}{9} =$
7. $2\frac{1}{4} \div \frac{1}{2} =$	16. $1\frac{1}{8} \div \frac{1}{2} =$	25. $8\frac{2}{7} \div \frac{2}{7} =$
8. $3\frac{1}{8} \div \frac{1}{4} =$	17. $3\frac{7}{12} \div \frac{1}{8} =$	26. $10\frac{2}{3} \div \frac{8}{9} =$
9. $2\frac{1}{6} \div \frac{2}{3} =$	18. $2\frac{5}{16} \div \frac{1}{3} =$	27. $3\frac{1}{3} \div \frac{5}{6} =$
10. $3\frac{3}{7} \div \frac{4}{5} =$	19. $4\frac{3}{5} \div \frac{9}{10} =$	28. $6\frac{3}{4} \div \frac{3}{8} =$
11. $4\frac{1}{8} \div \frac{3}{4} =$	20. $1\frac{8}{12} \div \frac{2}{5} =$	29. $7\frac{1}{2} \div \frac{2}{3} =$

Dividing a Fraction by a Mixed Number

HAROLD'S TRACK RECORD

1. Harold can run $\frac{1}{4}$ mile in $1\frac{1}{2}$ minutes. At this rate how far can he run in 1 minute? $\frac{1}{4}\div1\frac{1}{2}=?$

$1\frac{1}{2}=\frac{3}{2}$	← Change the mixed number to an improper fraction.
$\frac{1}{4}\div\frac{3}{2}=\frac{1}{4}\times\frac{2}{3}$	← Invert the divisor.
$\frac{1}{\cancel{4}_{2}}\times\frac{\cancel{2}^{1}}{3}=\frac{1}{6}$	← Cancel and multiply. Harold can run $\frac{1}{6}$ mile in 1 minute.

To divide a fraction by a mixed number, change the mixed number to an improper fraction, then invert the divisor and multiply. Cancel, if possible.

2. Bob's brother can run $\frac{3}{8}$ mile in $1\frac{1}{2}$ minutes. At this speed how far can he run in 1 minute?

Divide.

3. $\frac{1}{5}\div1\frac{1}{2}=$	**6.** $\frac{5}{8}\div1\frac{1}{3}=$	**9.** $\frac{4}{5}\div1\frac{1}{10}=$
4. $\frac{4}{6}\div1\frac{2}{3}=$	**7.** $\frac{1}{6}\div1\frac{1}{5}=$	**10.** $\frac{7}{12}\div1\frac{2}{3}=$
5. $\frac{2}{3}\div1\frac{1}{4}=$	**8.** $\frac{3}{4}\div1\frac{1}{8}=$	**11.** $\frac{3}{16}\div1\frac{7}{8}=$

Dividing a Whole Number by a Mixed Number

1. James works 5 division problems in $2\frac{1}{2}$ minutes. At this speed how many can he work in 1 minute? $5 \div 2\frac{1}{2} = ?$

$2\frac{1}{2} = \frac{5}{2}$	←Change the mixed number to an improper fraction.
$5 \div \frac{5}{2} = \frac{5}{1} \times \frac{2}{5}$	←Invert the divisor.
$\frac{\overset{1}{\cancel{5}}}{1} \times \frac{2}{\underset{1}{\cancel{5}}} = \frac{2}{1} = \mathbf{2}$	←Cancel and multiply.

James can work 2 division problems in 1 minute.

> **To divide a whole number by a mixed number, change the mixed number to an improper fraction and then invert the divisor and multiply. Cancel, if possible.**

2. Ruth and Jane rode 14 miles on their bicycles in $1\frac{3}{4}$ hours. How many miles an hour did they average?

Divide.

3. $3 \div 1\frac{1}{4} =$
4. $5 \div 1\frac{2}{3} =$
5. $8 \div 2\frac{1}{2} =$
6. $4 \div 3\frac{3}{5} =$
7. $6 \div 2\frac{1}{4} =$
8. $12 \div 1\frac{1}{3} =$
9. $15 \div 3\frac{1}{3} =$
10. $7 \div 1\frac{1}{7} =$
11. $10 \div 3\frac{1}{2} =$
12. $5 \div 1\frac{1}{4} =$
13. $9 \div 1\frac{1}{2} =$
14. $12 \div 1\frac{1}{8} =$
15. $6 \div 1\frac{1}{5} =$
16. $14 \div 1\frac{3}{4} =$
17. $5 \div 1\frac{1}{2} =$
18. $8 \div 1\frac{2}{3} =$
19. $4 \div 1\frac{1}{6} =$
20. $9 \div 3\frac{1}{5} =$
21. $10 \div 2\frac{1}{2} =$
22. $16 \div 3\frac{1}{6} =$
23. $11 \div 1\frac{5}{6} =$
24. $20 \div 2\frac{4}{5} =$
25. $12 \div 3\frac{1}{3} =$
26. $9 \div 2\frac{1}{2} =$
27. $16 \div 4\frac{4}{5} =$
28. $14 \div 3\frac{1}{2} =$
29. $24 \div 1\frac{3}{5} =$
30. $7 \div 2\frac{2}{5} =$
31. $10 \div 1\frac{7}{8} =$
32. $15 \div 1\frac{3}{4} =$

Dividing a Mixed Number by a Mixed Number

1. Mrs. Johnson used $9\frac{1}{3}$ yards of woolen goods in making dresses for her little daughter. She used $2\frac{1}{3}$ yards for each dress. How many dresses could she make from the goods? $9\frac{1}{3} \div 2\frac{1}{3} = ?$

$9\frac{1}{3} = \frac{28}{3}$	← Change $9\frac{1}{3}$ to an improper fraction.
$2\frac{1}{3} = \frac{7}{3}$	← Change $2\frac{1}{3}$ to an improper fraction.
$\frac{28}{3} \div \frac{7}{3} = \frac{28}{3} \times \frac{3}{7}$	← Invert the divisor.
$\frac{\overset{4}{\cancel{28}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{7}}} = \frac{4 \times 1}{1 \times 1} = \frac{4}{1} = 4$	← Cancel and multiply.

Mrs. Johnson could make 4 dresses.

To divide a mixed number by a mixed number, change both mixed numbers to improper fractions, then invert the divisor and multiply. Cancel, if possible.

2. Mr. Hyde's restaurant uses $6\frac{1}{4}$ pounds of butter a day. How many days will $37\frac{1}{2}$ pounds last?

Divide.

3.	$2\frac{1}{2} \div 1\frac{1}{3} =$	$12\frac{2}{3} \div 1\frac{1}{3} =$	$1\frac{2}{9} \div 1\frac{1}{3} =$
4.	$1\frac{1}{4} \div 3\frac{1}{5} =$	$4\frac{1}{2} \div 4\frac{1}{2} =$	$6\frac{3}{4} \div 1\frac{7}{8} =$
5.	$2\frac{1}{3} \div 1\frac{1}{6} =$	$8\frac{1}{6} \div 1\frac{3}{4} =$	$3\frac{5}{6} \div 1\frac{1}{12} =$

(a) When divisor, dividend, or both are fractions, invert the divisor and multiply.

(b) When divisor, dividend, or both are mixed numbers, first change the mixed numbers to improper fractions, then invert the divisor and multiply.

THE WILSON SCHOOL SEWING CLASS

1. Nine girls in a sewing class at Wilson school are each planning to make an apron. Each apron takes $1\frac{1}{8}$ yards of material. How many yards will be needed for all 9 aprons?

2. Each yard costs $16\frac{1}{2}$ cents. How much will each girl have to pay for apron material?

3. Six of the girls are each making a towel. Each towel takes $\frac{7}{8}$ yards of linen. How much linen is needed for all 6 towels?

4. Each yard of linen costs $18\frac{1}{4}$ cents. How much will each girl have to pay for the material in her towel?

5. Multiply.

26	39	298	586	67	293	784
6	57	24	657	70	600	402

6. Divide.

$4\overline{)28}$	$5\overline{)615}$	$9\overline{)9720}$	$6\overline{)\$114.96}$
$67\overline{)7236}$	$75\overline{)6000}$	$40\overline{)\$334.40}$	$154\overline{)35112}$

FINDING OUR WEAK SPOTS

If you have any weak spots in the division of fractions, this test will help you to find them. Write the examples on your paper. Number each exercise as in the test. Your teacher will sometimes have you do part of an example out loud to find your weak spot. Divide.

1. Whole Number by Proper Fraction

$2 \div \frac{1}{2} =$ $\quad 4 \div \frac{1}{3} =$ $\quad 6 \div \frac{7}{8} =$ $\quad 4 \div \frac{8}{9} =$

2. Proper Fraction by Proper Fraction

$\frac{1}{6} \div \frac{1}{4} =$ $\quad \frac{7}{8} \div \frac{7}{8} =$ $\quad \frac{2}{3} \div \frac{1}{6} =$ $\quad \frac{7}{8} \div \frac{5}{12} =$

3. Mixed Number by Proper Fraction

$3\frac{1}{8} \div \frac{1}{4} =$ $\quad 1\frac{1}{5} \div \frac{1}{5} =$ $\quad 2\frac{1}{6} \div \frac{3}{4} =$ $\quad 1\frac{1}{9} \div \frac{5}{6} =$

4. Proper Fraction by Whole Number

$\frac{1}{3} \div 3 =$ $\quad \frac{8}{9} \div 5 =$ $\quad \frac{7}{10} \div 7 =$ $\quad \frac{8}{11} \div 12 =$

5. Mixed Number by Whole Number

$1\frac{1}{4} \div 5 =$ $\quad 4\frac{2}{3} \div 2 =$ $\quad 5\frac{1}{2} \div 4 =$ $\quad 2\frac{1}{7} \div 10 =$

6. Proper Fraction by Mixed Number

$\frac{1}{6} \div 1\frac{1}{3} =$ $\quad \frac{1}{3} \div 1\frac{1}{6} =$ $\quad \frac{7}{12} \div 1\frac{1}{9} =$ $\quad \frac{3}{4} \div 1\frac{1}{6} =$

7. Whole Number by Mixed Number

$7 \div 1\frac{3}{4} =$ $\quad 8 \div 1\frac{1}{6} =$ $\quad 5 \div 8\frac{1}{3} =$ $\quad 4 \div 4\frac{1}{3} =$

8. Mixed Number by Mixed Number

$1\frac{1}{8} \div 2\frac{1}{3} =$ $\quad 1\frac{1}{5} \div 6\frac{2}{5} =$ $\quad 4\frac{1}{3} \div 4\frac{1}{3} =$ $\quad 4\frac{5}{8} \div 2\frac{1}{4} =$

9. Whole Number by Whole Number

$5 \div 8 =$ $\quad 12 \div 9 =$ $\quad 3 \div 4 =$ $\quad 15 \div 8 =$

CURING OUR WEAK SPOTS

If you made mistakes in any exercise on page 196, do the exercise of the same number on this page. Then try that part of the test again.

1. Whole Number by Proper Fraction

$4 \div \frac{3}{8} =$ $\quad 10 \div \frac{2}{5} =$ $\quad 18 \div \frac{3}{4} =$ $\quad 6 \div \frac{1}{3} =$

2. Proper Fraction by Proper Fraction

$\frac{1}{16} \div \frac{1}{4} =$ $\quad \frac{5}{6} \div \frac{5}{6} =$ $\quad \frac{8}{9} \div \frac{2}{5} =$ $\quad \frac{3}{8} \div \frac{4}{5} =$

3. Mixed Number by Proper Fraction

$5\frac{1}{2} \div \frac{1}{4} =$ $\quad 6\frac{2}{3} \div \frac{1}{3} =$ $\quad 2\frac{1}{6} \div \frac{3}{8} =$ $\quad 1\frac{1}{6} \div \frac{2}{3} =$

4. Proper Fraction by Whole Number

$\frac{1}{5} \div 5 =$ $\quad \frac{3}{8} \div 3 =$ $\quad \frac{7}{8} \div 7 =$ $\quad \frac{5}{8} \div 4 =$

5. Mixed Number by Whole Number

$1\frac{1}{6} \div 2 =$ $\quad 3\frac{4}{5} \div 5 =$ $\quad 10\frac{1}{2} \div 4 =$ $\quad 16\frac{2}{3} \div 2 =$

6. Proper Fraction by Mixed Number

$\frac{1}{2} \div 4\frac{1}{2} =$ $\quad \frac{1}{4} \div 2\frac{1}{2} =$ $\quad \frac{1}{6} = 1\frac{3}{4} =$ $\quad \frac{1}{8} \div 1\frac{1}{8} =$

7. Whole Number by Mixed Number

$5 \div 2\frac{1}{2} =$ $\quad 6 \div 2\frac{3}{4} =$ $\quad 10 \div 1\frac{1}{3} =$ $\quad 4 \div 3\frac{5}{8} =$

8. Mixed Number by Mixed Number

$1\frac{1}{2} \div 1\frac{1}{2} =$ $\quad 2\frac{3}{4} \div 1\frac{1}{4} =$ $\quad 6\frac{2}{3} \div 1\frac{3}{8} =$ $\quad 5\frac{1}{2} \div 1\frac{1}{3} =$

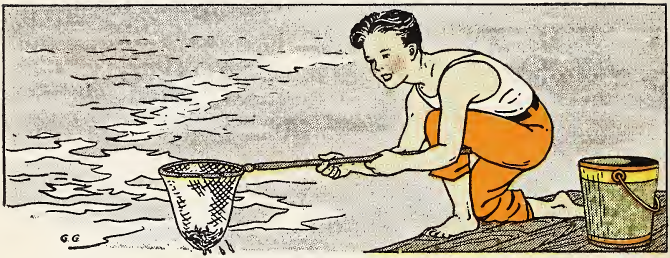
9. Whole Number by Whole Number

$8 \div 5 =$ $\quad 3 \div 7 =$ $\quad 5 \div 6 =$ $\quad 20 \div 8 =$

CHAPTER V

MEASURING THINGS

Counting Things by the Dozen



JACK CATCHES MINNOWS TO SELL

1. Jack lives near Star Lake. He catches minnows and sells them by the dozen. Monday he caught 3 dozen minnows. How many minnows are 3 dozen minnows? 3 dozen = ?

2. Tuesday he caught 42 minnows. How many dozen were in this day's catch?

3. Nell's mother sold 21 dozen eggs during the week beginning January 4. She sold them at 24¢ a dozen. For how much money did she sell all of them?

4. The next week Nell gathered 352 eggs. How many dozen did she gather? How much money would Nell's mother get for the eggs at 24¢ a dozen?

5. One day in the fall, Mr. Johnson brought home $2\frac{1}{2}$ dozen tulip bulbs that he bought at 70¢ per dozen. What was the cost of the tulip bulbs?

WHERE PEOPLE HAVE TO COUNT

Solve each problem in the easiest way, and give your reasons for thinking your way is the easiest.

12 dozen (doz.) = 1 gross (gro.)

1. Some things are purchased by the gross. A dealer in stationery bought 3 gross penholders at $5.04 per gross. He sold each penholder for 5 cents. After the penholders were paid for, how much money was left to cover profit and expense of handling?

2. The same dealer received a shipment of 864 pencils. He paid $2.16 per gross for the pencils. How much did they cost him?

3. Mary Lou's mother bought a dozen towels on sale for $3.69. They were towels regularly priced at 35¢ each. How much money did she save on the dozen?

4. Mr. Ray buys 6 dozen men's shirts of one kind for $64.80. What is the cost of each shirt?

5. He sells each shirt for $1.35. What is the gain on a shirt? On a dozen shirts? (Not allowing for expenses.)

6. Mr. Harris, a candy dealer, paid $4.80 for 6 cartons of chocolate bars. A carton holds 2 dozen bars. How much did he pay per dozen?

7. If Mr. Harris sold the chocolate bars at 5¢ each, how much did he make on a dozen? How much did he make on the whole lot? (Not allowing for expenses.)

HOW CHILDREN CAN MEASURE

1. Draw lines on the schoolroom floor 1 foot long, 1 yard long, and 1 rod long.

This table will help you to draw them correctly.

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$5\frac{1}{2}$ yards or $16\frac{1}{2}$ feet	= 1 rod (rd.)
320 rods, 1760 yards, or 5280 feet	= 1 mile (mi.)

2. Measure the length of your schoolroom in feet. Change the length to yards without measuring it in yards.

3. Helen's mother wants to trim a dresser scarf with lace edging. She finds that she needs 144 inches of edging. How many yards must she buy?

4. Write each of the following numbers of inches as a fractional part of a yard.

6 in.   9 in.   12 in.   8 in.   18 in.

5. Jim makes a kite and ties it to a ball of 330 feet of string. The length of the string is what fractional part of a mile? $\frac{330}{5280} = ?$

In comparing lengths, always use the same unit of length or kind of measurement for each length you are comparing.

6. Russel and Jim measure the length of their schoolroom. Russell finds it is 13 yards long. Jim finds that it is 41 feet. Do the boys agree?

7. Harry and Bob are making kites. Harry uses $\frac{2}{3}$ yard of silk and Bob uses 27 inches of silk. Which boy uses more silk, and how much more?

HOW TALL ARE YOU?

1. When the children in the Harrison school were measured to find out how tall they are, Harry measured 54 inches, and Wilbur measured 4 ft. 9 in. Which boy is taller, and how much taller?

2. Compare the heights of the following children. Tell in each case which child is taller, and how much taller. Compare Helen and Amy first.

Helen	48 in.	Amy	4 ft. 2 in.
George	60 in.	Elmer	4 ft. 10 in.
Dan	57 in.	Donald	4 ft. 7 in.
Ellen	49 in.	Katharine	4 ft. 8 in.
Beatrice	55 in.	Elizabeth	4 ft. 4 in.

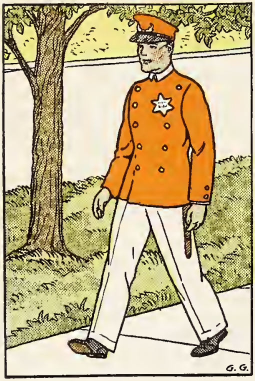
3. Jim is the tallest boy in his class. He is 5 ft. 5 in. tall. Jack is the shortest boy in the class. He is 4 ft. 2 in. tall. How many inches taller is Jim than Jack?

4. Pearl is the tallest girl in her class. She is 5 ft. 3 in. tall. Florence is the shortest girl in the class. She is 4 ft. 1 in. tall. How many inches taller is Pearl than Florence?

5. Miss Jackson is the fifth grade teacher in Harrison school. She is 5 ft. 6 in. tall. How many inches taller is she than Jim? Than Florence?

6. Two of the boys have measured the height of their schoolroom. One boy says it is 16 ft. high, and the other boy says it is $5\frac{1}{3}$ yd. high. Show whether or not the two boys agree.

SOME PROBLEMS ABOUT MEASURING



1. A policeman found that he walked $3\frac{1}{2}$ miles in going over his beat once. How many times must he go over his beat to walk 14 miles?

2. The running track at Roosevelt High is 440 yards long. How many times must Paul go around it to run $\frac{1}{2}$ mile?

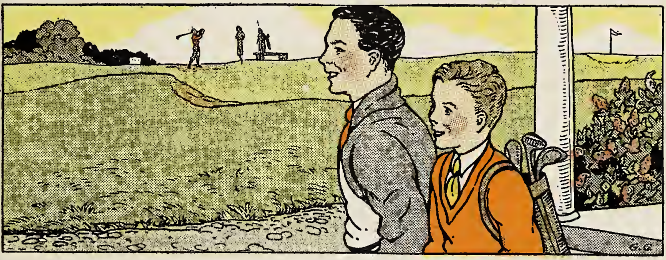
3. Richard, Bill, and Fred are hiking to camp. They walk $3\frac{1}{2}$ miles an hour, and it takes them $2\frac{1}{4}$ hours. How far is it to the camp?

4. The first flight of an airplane from the United States to Hawaii was made in July, 1927, a distance of 2400 miles in 26 hours. What was the average distance an hour?

5. The first non-stop flight across the North American continent was made in May, 1923, a distance of 2700 miles in 27 hours. What was the average distance an hour?

6. The first non-stop flight from America to Germany was made in June, 1927, a distance of about 3790 miles in 42 hours. What was the average distance an hour?

7. Col. Lindbergh's flight across the ocean was made in $33\frac{1}{2}$ hours. If the distance was 3350 miles, what was his average number of miles an hour?



PLAYING GOLF

Distances on the Evergreen Course

From Tee 1 to Hole 1, 250 yd.
From Tee 2 to Hole 2, 375 yd.
From Tee 3 to Hole 3, 230 yd.
From Tee 4 to Hole 4, 350 yd.
From Tee 5 to Hole 5, 505 yd.
From Tee 6 to Hole 6, 475 yd.
From Tee 7 to Hole 7, 275 yd.
From Tee 8 to Hole 8, 375 yd.
From Tee 9 to Hole 9, 450 yd.

Allow 75 yards more for extra walking in playing each hole on the course.

1. Five days a week Mr. Grayson plays 9 holes of golf on the Evergreen course. How many miles must he walk each day in playing the 9 holes?

2. His friend, Mr. Day, plays 18 holes twice a week. How many miles must he walk on the golf course in one week?

3. John is the caddy for Mr. Grayson. How much does John earn in 4 weeks, if Mr. Grayson pays him 35¢ for each game of 9 holes?

1. Elsie kept a record of the time that she practiced on the piano during one week. How many hours did she practice during the whole week?

Elsie's Record of Her Practice

Monday	54 min.	Thursday	30 min.
Tuesday	35 min.	Friday	60 min.
Wednesday	50 min.	Saturday	40 min.

The following table of time will help you to work the problem.

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
12 months (mo.) or 365 days	= 1 year (yr.)
366 days	= 1 leap year

A. M. means forenoon, or from midnight to noon; P. M. means afternoon, or from noon to midnight.

2. In Elsie's school, work begins at 8:30 A. M. The morning work ends at 11:45 A. M. How many hours is it from 8:30 A. M. to 11:45 A. M.?

3. The afternoon work begins at 1:15 P. M. and ends at 3:30 P. M. How long does the afternoon work last?

4. Elsie's father goes to business each morning at 8:45. He gets home at 6:00 P. M. How many hours is he away each day?

1. An electric train leaves South Bend, Indiana, at 9 A. M. and arrives in Chicago at 11:20 A. M. How long does it take the train to make the trip?

2. Helen visited her grandmother for eleven weeks last summer. How many days did the visit last?

3. A teacher averages 25¢ for her breakfast, 40¢ for her lunch, and 65¢ for her dinner. How much does she pay for all her meals during the month of September? (Read the rhyme below.)

> "Thirty days hath September,
> April, June, and November.
> All the rest have thirty-one,.
> But February, which alone has twenty-eight,
> And in leap year twenty-nine."

4. There are 100 years in a century. The first Spanish Mission in California was founded about $1\frac{1}{2}$ centuries ago. About how many years ago was that?

5. Years that can be divided by 4 are leap years, but century years are not leap years unless they can be divided by 400. Which of the following years were leap years?

1800	1820	1864	1888	1900	1916

MEASURING LIQUIDS LIKE WATER AND MILK

1. Richard's family use $2\frac{1}{2}$ quarts of milk every day. How many pints do they use?

We need to know this table of **liquid measure** in working the problem:

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

2. Every day Mr. Appleton ships 20 gallons of milk to a city dairy. The city dairy puts up half the milk in quart bottles and the other half in pint bottles. How many quart bottles will be used? How many pint bottles?

3. Mrs. Gray orders 1 quart of milk a day. Every two days she orders $\frac{1}{2}$ pint of coffee cream. The milk costs 11¢ a quart and the cream 18¢ a half-pint. What is Mrs. Gray's milk bill for September?

4. One week in August Donald and Lucy sold 8 glasses of lemonade on Monday, 12 glasses on Tuesday, 10 on Wednesday, 14 on Thursday, 8 on Friday, and 16 on Saturday. If 1 quart of lemonade makes 4 glasses, how many quarts did they sell during the week?

5. The filling station man sold Mr. Thompson 15 gallons of gasoline at 21¢ a gallon and 5 quarts of oil at 25¢ a quart. What did the gasoline and oil cost Mr. Thompson?

6. Mr. Anderson uses oil to heat his house. He needs 325 gallons. The price is 6¢ a gallon for the oil delivered. How much will 325 gallons cost him?

MEASURES IN COMMON USE

The following table of **dry measure** is sometimes used in measuring fruits, vegetables, and grains:

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

1. Thomas lives on a farm. He raises peas and beans. One week he picked 5 pecks of peas and 7 pecks of beans. He sold the peas at 8¢ a quart and the beans at 5¢ a quart. How much money should he get?

2. During the raspberry season Thomas sold 6 crates of raspberries at 15¢ a quart. Each crate held 16 quarts. How much should he get for the 6 crates?

3. In August he picked 8 bushels of tomatoes and sold them at the city market for 20¢ a peck. What was the selling price of the tomatoes?

4. A farmer has 48 bushels of oats on hand to feed his horses. If he uses $1\frac{1}{2}$ pecks each day, how many days will the oats last?

5. Walter gathered a bushel of walnuts and sold them in boxes at 10¢ a box. If he filled 5 boxes out of each peck, how much money should he get for the whole bushel?

Many things that used to be sold by the peck or bushel are now sold by weight.

6. Say the answers to fill the blanks.

64 quarts = ___ bushels	32 pints = ___ pecks
5 pecks = ___ quarts	3 pecks = ___ quarts
$2\frac{1}{2}$ bushels = ___ pecks	24 pecks = ___ bushels

MANY THINGS ARE SOLD BY WEIGHT

1. Mrs. White wanted $1\frac{1}{2}$ pounds of steak. If the butcher placed $1\frac{1}{2}$ pounds of steak on the scales, how many ounces would the scales show?

To work this problem, you will need the following **table of weight**:

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 hundredweight (cwt.)
2000 pounds	= 1 ton (T.)

2. This week Pauline's baby sister weighed 10 lb. 14 oz. Last week she weighed 10 lb. 6 oz. How many ounces did she gain this week? What part of a pound did she gain?

3. Jack buys 10¢ worth of candy that sells at 40¢ a pound. What part of a pound will he get? How many ounces will he get?

4. Mr. Arnold's car weighs 4200 pounds. How many tons does it weigh?

5. Billy's father ordered 10 tons of coal. The coal was delivered by truck in the following loads:

First load	7500 lb.
Second load	6400 lb.
Third load	6100 lb.

Did Billy's father get 10 T. of coal?

6. Mr. Larson, a high school principal, has a new position in another town for the coming year. He is planning to send his books by freight. The weight of the packed box of books is 150 lb. What will be the freight charge at $1.26 a hundredweight?

7. In some parts of the United States hard coal sells for $16 a ton. At that price how much must Nell's father pay for 6500 lb. of hard coal?

8. Mrs. Jackson sends her flat work (towels, sheets, etc.) to the laundry. At 12¢ a pound, what is her expense in 3 weeks if she sends $17\frac{3}{4}$ lb., $18\frac{1}{2}$ lb., and $18\frac{1}{4}$ lb.?

In the sale of some articles the number of bushels is often found by weighing a truck load or a carload and dividing the total weight of the articles by the number of pounds in a bushel. This is done in selling wheat and other kinds of grain.

9. Mr. Williams brought a truck load of wheat from the thresher to the grain elevator. It weighed 5580 pounds after taking out the weight of the truck. At 60 pounds a bushel, how many bushels of wheat were in the load?

10. John Arnold brought a load of corn in the ear to the elevator. It weighed 3500 lb. How many bushels of corn were in the load, if we count 70 lb. to the bushel?

11. Say the answers to fill the blanks.

$\frac{7}{8}$ lb. = ___ oz.	2400 lb. = ___ T.
$2\frac{1}{2}$ cwt. = ___ lb.	48 oz. = ___ lb.
$\frac{1}{5}$ T. = ___ lb.	400 lb. = ___ cwt.
$\frac{3}{4}$ lb. = ___ oz.	40 oz. = ___ lb.

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 18 minutes. Your score will be twice the number of problems you solve correctly in the time allowed.

Read each problem carefully. Ask yourself:

(a) What am I to find? (b) What am I told? (c) What should I do to solve the problem?

	Scale	Score
A	Ex.	= 12 or 10
B	Good	= 8
C	Fair	= 6
D	Poor	= 4 to 0

1. Harold pulled 192 radishes from his garden and tied them in bunches of 12 each. He sold all of them at 2 bunches for 7¢. For how much did he sell the radishes?

2. A dealer in school supplies buys 4 gross of pencils at $4.32 a gross. He sells each pencil for 5¢. What does he make on 4 gross of the pencils?

3. Jane is tying up 12 favors for a birthday party. She needs 18 inches of ribbon for each one. How many yards must she buy for the 12 favors?

4. Richard's father buys 12 rods of heavy wire fencing to fence his chicken yard. Find the cost at 7¢ a foot.

5. The running track at the Lincoln High school is $\frac{1}{2}$ mile long. The track at the Jackson High school is 440 yards long. Which track is longer?

6. Bob goes to the University High school. He is practicing the 100-yard swim. The tank is 60 ft. long. How many lengths will he have to swim to make 100 yards?

EVERYDAY USES OF MEASURES

1. Harry's aunt was coming to visit. Harry called up the railroad station to ask about the train. It was due at 12:10 P. M., but it was 35 minutes late. What time was it expected to arrive?

2. Jean and her mother timed themselves on washing the dinner dishes. It took them exactly 15 minutes. What part of an hour did it take them?

3. Small children should sleep 10 hours every night. What fractional part of 24 hours is that?

4. Each of the 4 members in the Lang family drinks a glass of milk at breakfast. One pint of milk makes two glassfuls. How many quarts will Mrs. Lang use for breakfast in two weeks?

5. Elmer's father bottles 6 gallons of vinegar in quart bottles. He sells each bottle at 30¢. For how much does he sell all the vinegar?

6. Mr. Bronson had 5 acres in potatoes. He got an average of 90 bushels from each acre. How much will he get for his potatoes, at 95¢ a bushel?

7. Mr. Green feeds each of his two horses 4 quarts of oats a day. At this rate, how many days will 12 bushels of oats last?

8. A candy dealer puts up 6 lb. of candy in 24 small bags. If all the bags are of the same size, how many ounces are in each bag?

9. At the close of a day's business a coal dealer finds that he has sold 47,000 lb. of soft coal. How many tons has he sold?

HAVE YOU FORGOTTEN THESE?

1. Change to higher or lowest terms.

$\frac{1}{12} = \frac{}{24}$	$\frac{7}{8} = \frac{}{16}$	$\frac{6}{8} =$	$\frac{12}{16} =$
$\frac{5}{6} = \frac{}{12}$	$\frac{2}{3} = \frac{}{6}$	$\frac{3}{9} =$	$\frac{10}{15} =$

2. Add and check.

$\frac{1}{2}$	$\frac{3}{4}$	$\frac{5}{6}$	$6\frac{3}{4}$	$\frac{5}{8}$	$7\frac{1}{2}$
$\underline{\frac{1}{5}}$	$\underline{\frac{3}{8}}$	$\underline{\frac{2}{3}}$	$\underline{\frac{5}{6}}$	$\underline{2\frac{3}{4}}$	$\underline{6\frac{1}{2}}$

3. Subtract and check.

$\frac{7}{8}$	$6\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{3}{4}$	$4\frac{1}{3}$	$22\frac{1}{5}$
$\underline{\frac{1}{6}}$	$\underline{\frac{1}{3}}$	$\underline{\frac{1}{2}}$	$\underline{2\frac{1}{8}}$	$\underline{1\frac{5}{8}}$	$\underline{6\frac{1}{3}}$

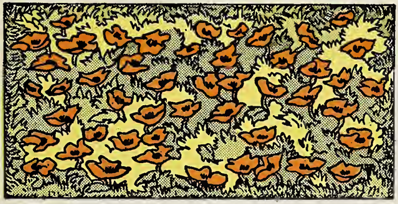
4. Multiply and check.

$\frac{1}{3} \times 2 =$	$\frac{3}{7} \times \frac{5}{6} =$	$5 \times 8\frac{1}{4} =$	$3\frac{1}{2} \times 3\frac{1}{2} =$
$4 \times \frac{3}{4} =$	$2\frac{7}{8} \times \frac{1}{8} =$	$\frac{1}{3} \times 1\frac{1}{3} =$	$6\frac{1}{5} \times 4 =$
$5 \times \frac{8}{9} =$	$4\frac{1}{2} \times \frac{2}{3} =$	$11 \times 6\frac{1}{3} =$	$6\frac{1}{9} \times \frac{1}{5} =$

5. Divide and check.

$3 \div \frac{1}{3} =$	$\frac{1}{8} \div 6 =$	$\frac{1}{5} \div \frac{1}{2} =$	$1\frac{2}{3} \div 5 =$
$6 \div 2\frac{1}{2} =$	$3\frac{1}{3} \div 1\frac{1}{4} =$	$5\frac{7}{8} \div 4\frac{1}{4} =$	$2\frac{1}{2} \div 1\frac{1}{4} =$
$5 \div \frac{1}{4} =$	$\frac{1}{4} \div 5 =$	$6 \div \frac{1}{3} =$	$\frac{1}{3} \div 6 =$
$7\frac{1}{2} \div 6 =$	$4 \div 3\frac{1}{3} =$	$\frac{1}{4} \div \frac{1}{3} =$	$4\frac{1}{2} \div 1\frac{1}{2} =$

You have often looked at the top of a table. The tops of most tables have 4 edges or sides and 4 square corners. Can you name some other things that have the same shape? On this page you will learn the name of the shape of these things.



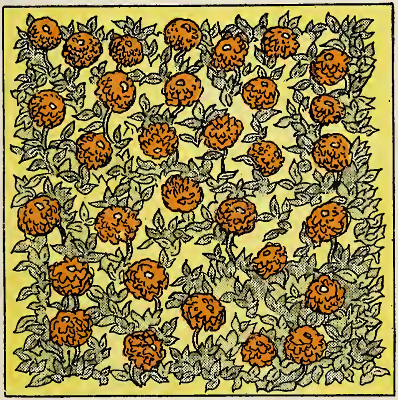
1. This drawing shows one of the flower beds in Mrs. Lanning's garden. This flower bed has the shape of a **rectangle**.

Read, and say the words that have been left out.

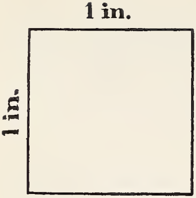
A rectangle has __ sides.

It has __ square corners or right angles.

The opposite sides are the __ in length.

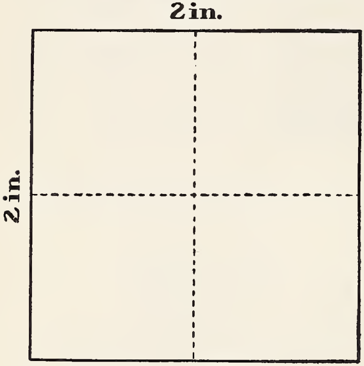


2. Here is a drawing of another flower bed. It has the shape of a rectangle too, but there is a difference between this rectangle and the one above. In this rectangle all the sides have the same length. This rectangle is called a **square**.



On this page you will learn more about squares and rectangles.

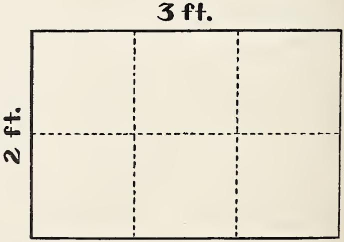
1. Here is a square that measures 1 inch on each side. We say that its **area** is 1 square inch (sq. in.). The square has __ sides and 4______corners.



2. This square is 2 inches on each side. Read what is said about it below. Say the words that have been left out.

In this square there are __ rows of square inches. Each row contains — square inches. Two rows contain 2×2 sq. in. or __ sq. in. The area is __ sq. in.

3. Here is a picture of a rectangle. Its length is 3 ft. and its width 2 ft. We may speak of it as a rectangle 3 ft. **by** 2 ft. You can see that it contains 6 sq. ft. Its area is 6 square feet.



To find the area of a rectangle, multiply its length by its width.

STUDYING RECTANGLES ALL ABOUT US

1. Henry's vegetable garden is 20 ft. by 15 ft. How many square feet are there in it?

2. Helen's bedroom is 20 ft. by 16 ft. Grace's bedroom is 21 ft. by 14 ft. Which room is larger, and how much?

3. Mr. Burt agrees to pay a man $12\frac{1}{2}$¢ a square yard for sodding his lawn. The lawn measures 42 ft. by 36 ft. How much should Mr. Burt pay the man?

4. Mr. Elling owns a lunchroom. He plans to buy heavy glass for table coverings. Each table is 5 ft. by 4 ft. What will be the area of each piece of glass?

5. Julia's father is having a cement walk laid between the house and garage. The walk will be 21 yd. long and 1 yd. wide. How much will it cost at $\$1.33\frac{1}{3}$ a square yard?

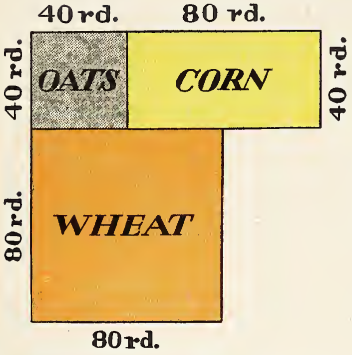
Mark the four corners of each of these rectangles on the floor or on the ground. Measure to get them right. Then find the areas.

6. 3 ft. by 8 ft. **7.** 2 ft. by 5 ft.

8. The Tabor Cement Company rented 3200 sq. ft. of floor space for offices in the Sever Building. The space was 50 ft. wide. How long was it?

9. The alley behind Mr. Stuart's home is to be paved. He has to pay 15¢ for each square foot of pavement from his lot to the middle of the alley. The lot is 44 ft. wide along the alley. The alley is 20 ft. wide. How much must he pay?

MR. BROWN'S FARM



1. Here is a diagram of Mr. Brown's farm. He has divided his land into three parts. In the smallest part he has planted oats. How many acres of land has he in oats?

The following table of **square measure** will help you to find out.

144	square inches (sq. in.)	= 1 square foot (sq. ft.)
9	square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$	square yards	= 1 square rod (sq. rd.)
160	square rods	= 1 acre (A.)
640	acres	= 1 square mile (sq. mi.)

To find how many acres are used for oats, find how many square rods are in that part. As the area is in square rods, say 40×40 sq. rd. = 1600 sq. rd.

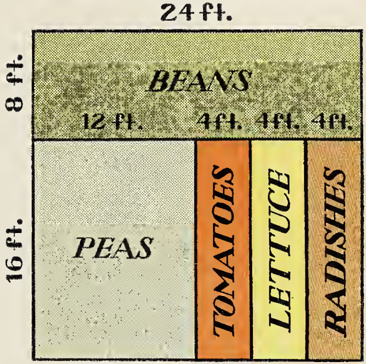
There are 160 sq. rd. in 1 acre. To find the number of acres in 1600 sq. rd., divide 1600 sq. rd. by 160 sq. rd. 1600 sq. rd. ÷ 160 sq. rd. = 10.

Mr. Brown uses 10 A. of his farm for raising oats.

2. He uses the part of his farm that measures 80 rd. by 80 rd. for raising wheat. How many acres are used for raising wheat?

3. How many acres are used for raising corn?

ROBERT'S GARDEN



1. Here is a diagram of a garden that Robert is planning.

How many square feet is he planning to plant in beans? In peas? In tomatoes? In lettuce? In radishes?

2. If he allows 8 sq. ft. for each, how many tomato plants should he set?

3. The beans are to be planted in rows the long way of the bean patch. The rows are to be 24 inches apart. He will leave a space 12 inches wide on each side of the bean patch. How many rows of beans can he plant?

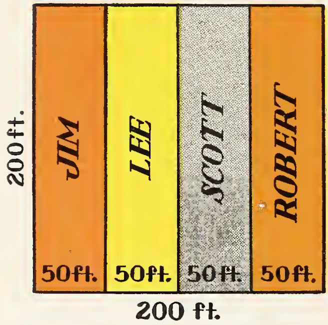
4. Robert is going to plant a part of the front yard in new grass. This part is 30 ft. by 30 ft. A pound of grass seed is enough for 100 sq. ft. How many pounds will Robert need for the part he is going to plant?

5. Mr. Johnson's farm is 100 rd. by 80 rd. How many acres are there in the farm?

6. Say the answers to fill the blanks.

(a) 4 sq. yd. = ____ sq. ft.
(b) 576 sq. in. = ____ sq. ft.
(c) 480 sq. rd. = ____ A.
(d) 2 sq. mi. = ____ A.

HOW LARGE IS AN ACRE?



Robert lives in a small town. His home is on a lot 50 ft.$\times$200 ft. Jim, Lee, and Scott live on lots the same size as Robert's. If we put the four lots together, we shall have a piece of ground almost as large as an acre. An acre may have many shapes. If we think of it as square, it will be about 209 feet on each side.

1. Do the four lots make more or less than an acre?

2. Robert's father has given him a plot of land 8 ft.$\times$7 ft. for a garden. Scott has a garden plot that is 11 ft.$\times$4 ft. Which boy has the larger garden?

3. Jim's father used a space 6 ft.$\times$5 ft. to make a fish pond in his garden. How many square feet did he use?

4. Find the number of square feet in a square rod.

5. Show that there are 43,560 sq. ft. in an acre.

6. Find out whether a piece of ground 209 ft. square is more or less than an acre.

7. Clara lives on a lot 35 ft. by 100 ft. Would ten lots of this size be more or less than an acre?

1. In the 5A class Miss Evans asked Ralph to find the number of square feet in one slate of blackboard in the room. Ralph found that the slate measured 2 ft. 2 in. by 4 ft. 3 in. This was a new kind of problem for Ralph. Miss Evans told him to change both the length and the width to inches or to feet. Ralph changed both to inches.

2 ft. 2 in. $=$ 26 in.; 4 ft. 3 in. $=$ 51 in.
26×51 in. $=$ 1326 in.
1326 in. $\div$ 144 in. $= 9\frac{5}{24}$
The slate contains $9\frac{5}{24}$ sq. ft.

Then Miss Evans told Ralph that it might be easier to change both the length and width to feet. So Ralph changed the length and width to feet.

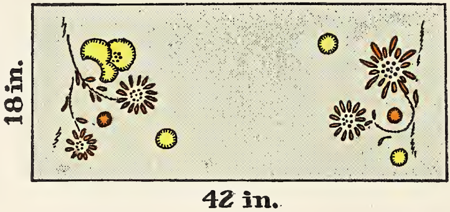
2 ft. 2 in. $= 2\frac{1}{6}$ ft.; 4 ft. 3 in. $= 4\frac{1}{4}$ ft.
$2\frac{1}{6} \times 4\frac{1}{4} = \frac{13}{6} \times \frac{17}{4} = \frac{221}{24}$
$\frac{221}{24}$ sq. ft. $= 9\frac{5}{24}$ sq. ft.

2. Mrs. Giles wants to paint a table top that is 5 ft. 4 in. by 18 in. She has a can of paint that will cover 12 square feet. Will that be enough? How many square feet are in the table top?

Find the areas.

3. 2 ft. 1 in. $\times$ 15 in.
4. 3 yd. 2 ft. $\times$ 1 ft. 6 in.
5. 4 ft. 5 in. $\times$ 2 ft. 3 in.
6. 6 yd. 1 ft. $\times$ 2 ft. 4 in.
7. 5 ft. 6 in. $\times$ 1 yd. 1 ft.
8. 4 yd. 9 in. $\times$ 2 ft. 6 in.

1. Dot is making lace edging for a dresser scarf for her mother's birthday present.



How many inches of edging must she make for this scarf? How many yards?

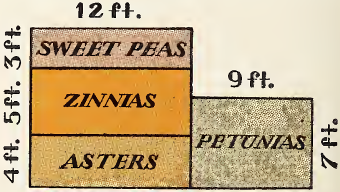
The distance around a rectangle is called its **perimeter**.

2. What is the perimeter of a rectangle that measures 18 yd. by 7 yd.?

3. How many feet of fencing will be needed to go around a rectangular lot 50 ft. by 150 ft.?

4. Which has a greater perimeter, a rectangle that measures 9 ft. by 5 ft., or a 6-foot square? How much greater?

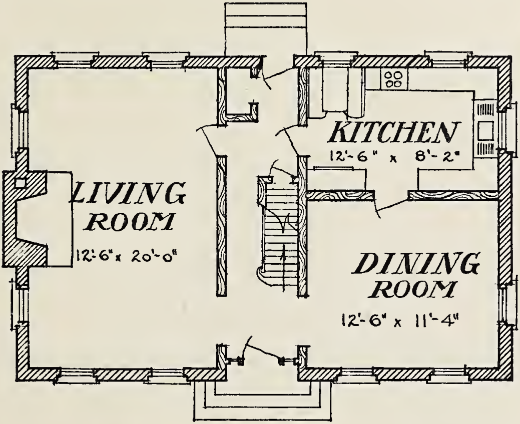
5. Here is the plan of Louise's flower garden. She wants to put a wire around it. How much will the wire cost at 50¢ a 100 feet?



Find the perimeters of the following rectangles.

6. 2 ft. by $1\frac{1}{2}$ ft.
7. 32 in. by 15 in.
8. 4 ft. by $1\frac{1}{3}$ ft.
9. 2 yd. $\times$ 18 in.
10. 3 ft. $\times 2\frac{1}{2}$ ft.
11. 4 yd. $\times 1\frac{1}{4}$ yd.

Richard's father is having a new house built. The following diagram shows the plan for the first floor.



THE FIRST FLOOR PLAN FOR RICHARD'S HOME

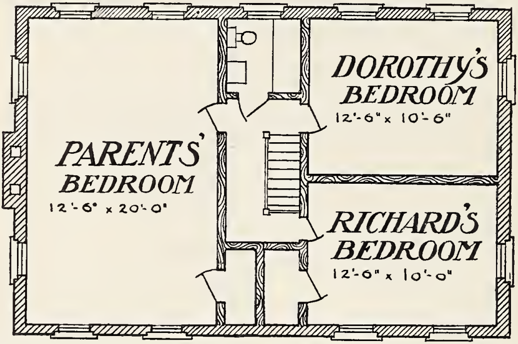
Each single measurement such as the length or width may be called a dimension. On a drawing the sign for foot is (′) and for inch is (″).

1. What are the dimensions of the kitchen? We read these dimensions by saying the kitchen is __ by __.

2. What are the dimensions of the dining room?

3. What is the length of the living room? What is its width?

Here is a diagram showing the plan for the second floor in Richard's new home.



THE UPSTAIRS PLAN

1. What are the dimensions of Richard's bedroom?

2. His sister's bedroom is next to his. What are its dimensions?

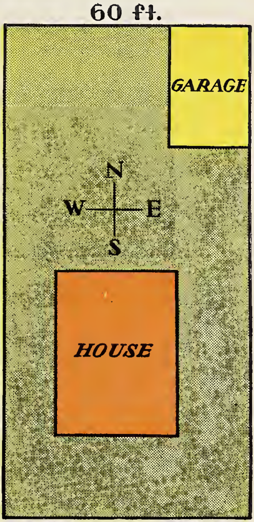
3. Tell if Dorothy's room is larger or smaller than Richard's room. How do you know?

4. How many yards of carpet a yard wide would be needed to cover the floor in his sister's bedroom?

5. If the hall is 8 ft. wide, would a lot 50 ft. wide be large enough for this house with an 8-foot driveway on one side and 4 feet of space on the other side of the house?

6. If Richard places a rug 9 ft. wide and 12 ft. long in his bedroom, what width of floor on each side of the rug will be left bare? What width of floor at each end of the rug will be left bare?

DIAGRAM OF A HOUSE AND LOT



$\frac{1}{4}$ *INCH to 10 FEET*

Here is a diagram of a lot, showing the size and the location of the house and the garage. The lot is 60 ft. wide.

1. In the diagram $\frac{1}{4}$ in. stands for 10 ft. How many inches should stand for 60 ft. in this diagram?

2. Measure the width of the diagram with a ruler and tell whether it has the right number of inches.

3. When we let a short line stand for a longer distance in a diagram, we are drawing to a **scale**. Read below the diagram and tell on what scale it is made.

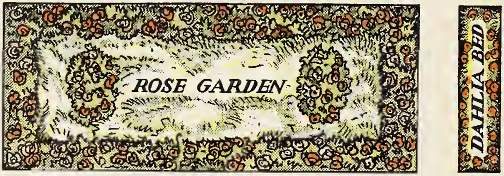
4. Measure with a ruler to see how many $\frac{1}{4}$ in. are in the length of the diagram. If each $\frac{1}{4}$ in. stands for 10 ft., how long is the lot?

5. Counting each $\frac{1}{4}$ in. as 10 ft.:

(a) How wide is the house? (b) How long?
(c) How wide is the garage? (d) How long?
(e) How far is the house from the south line of the lot? (f) From the west line? (g) From the east line? (h) From the north line?
(i) How far is the garage from the house?

FLOWER GARDEN, YARD, AND HOUSE

1. In this diagram of a flower garden, the scale is $\frac{1}{4}$ in. to 1 ft.



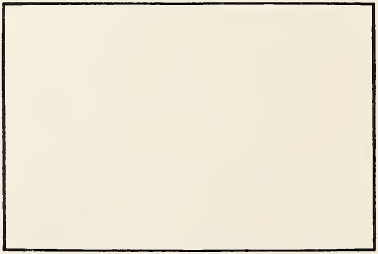
What are the dimensions of the rose garden? The dahlia bed?

2. The children in the 5A class at Jefferson school drew a plan of their schoolroom floor. The floor measures 40 ft. by 32 ft.

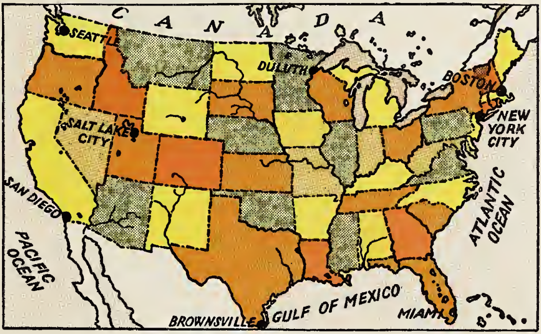
The boys' drawing was 10 in. by 8 in. What scale did they use?

The girls' drawing was 5 in. by 4 in. What scale did they use?

3. Ralph drew this diagram of his garden. Here is the scale that he used: $\frac{1}{16}$ in. $= 1$ yd. What are the dimensions of the garden?



Here is a map of the United States. You can see that the scale is 1000 miles to the inch. That means that every inch on the map stands for 1000 miles.



UNITED STATES
SCALE—1000 MILES=1 INCH

1. By using the scale on your ruler find how far it is from New York City to Seattle.

2. How far is it from Duluth to Brownsville?

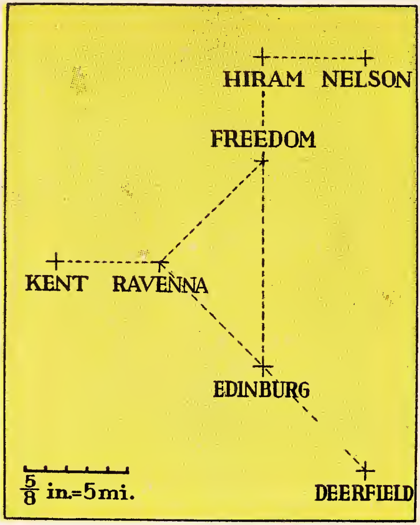
3. How far is it from Boston to Duluth?

4. How far will an airplane fly in a straight line from Boston to San Diego?

5. How far is it by plane from New York City to Miami?

6. What is the distance from Seattle to Salt Lake City?

7. How far is it from Seattle to San Diego?



1. Here is a map of Portage county showing the location of seven towns and the roads connecting these towns. The scale is 8 miles to one inch, 1 mile to one-eighth of an inch.

2. How far is it by the road from Ravenna to Deerfield?

3. How far is it from Edinburg to Hiram?

4. How far is it from Ravenna to Nelson by road?

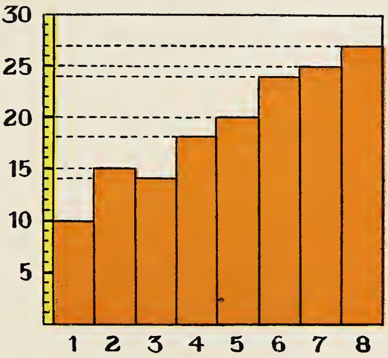
5. How far from Kent to Hiram?

6. How far is it from Kent to Edinburg?

7. How long is the county? How wide?

GRAPHS USED IN SCHOOL AND BUSINESS

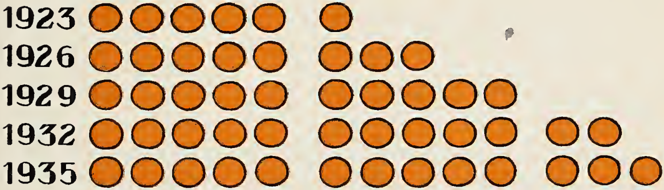
1. The children in grade 5A have taken 8 tests in fractions. Their teacher has shown the average scores of the class on a graph like this.



The numbers on the left of the graph stand for the average scores; the numbers below, for the 8 tests.

What was the average score of the class on each test?

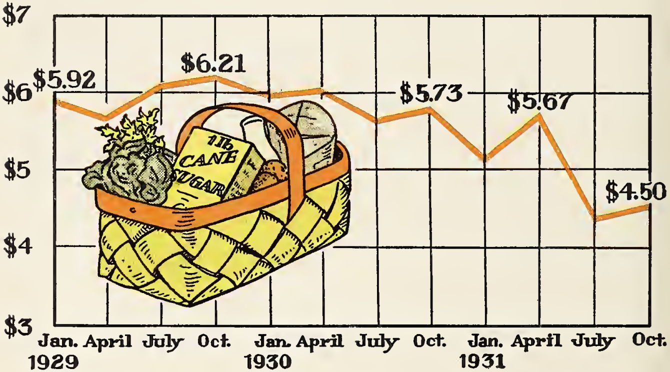
2. The graph below shows how fast the enrollment grew in the Otis school from the year 1923 to the year 1935. Each circle represents fifty children.



What was the enrollment in 1923? In 1929? In 1935?

How long did it take the school to double its enrollment?

Here is a graph that shows how the prices of foods changed during the years 1929, 1930, and 1931. The broken line represents the changing values of a market basket containing food for a family of four for two days.



1. During the "boom" in 1929 what was the top price?

2. What was the lowest price in 1930? In 1931?

3. Suppose you paid $1.60 for some food in January, 1929. About how much would the same food have cost in October, 1931?

4. About how much more did the basket of food cost in April, 1931, than it did in January, 1931?

5. How much was saved on a market basket in October, 1931, over the cost in April of that year? If that was a two-day supply for a family, how much would be saved in a week?

1. Georgetown is 10 miles west of Jonesville. Carlsburg is 8 miles east of Jonesville. With a scale of $\frac{1}{2}$ inch to the mile, draw a diagram to show the distance between Georgetown and Jonesville. Between Jonesville and Carlsburg.

2. What is the perimeter of a rectangle 30 in. by 9 in?

3. In the following diagram of a vegetable garden, the scale is $\frac{1}{8}$ in. = 1 ft. What are the dimensions of the radish bed? The lettuce bed? The onion bed?

4. If a half bushel of onions were dug from each two rows in the onion bed, how many bushels did the onion bed yield?

5. The radishes were tied in small bunches when gathered. For four weeks during the spring six bunches of radishes were gathered each week from each row. How many bunches did the radish bed furnish that season?

6. There were fifteen heads of lettuce in each row. Two rows were kept for use on the family table. The lettuce heads in the other rows were sold at 5¢ each. How much money did they bring?

THREE QUESTIONS TO ASK

1. Henry's father owns a car. He averages $16\frac{1}{2}$ miles on a gallon of gas. Tom's father also owns a car. He averages $14\frac{3}{4}$ miles on a gallon of gas. How many more miles can Henry's father go in his car on 1 gallon of gas than Tom's father in his car?

Answer these three questions for the problem.

a. What is wanted? The number of miles more Henry's father can go in his car on 1 gallon of gas than Tom's father.

b. What is given? The average number of miles ($16\frac{1}{2}$) that Henry's father can go in his car and the average number ($14\frac{3}{4}$) that Tom's father can go in his car on 1 gallon of gas.

c. What should be done? Subtract the number of miles Tom's father averages from the number of miles that Henry's father averages.

$$16\tfrac{1}{2} = 16\tfrac{2}{4} \qquad\qquad \begin{array}{r} 16\tfrac{6}{4} \\ \underline{15\tfrac{3}{4}} \\ 1\tfrac{3}{4} \end{array}$$
$$14\tfrac{3}{4} = 14\tfrac{3}{4}$$

Henry's father averages $1\frac{3}{4}$ miles more on a gallon of gas than Tom's father.

2. A school cafeteria uses $5\frac{1}{2}$ lb. of butter every day for 5 days. How many pounds of butter are used during the school week?

3. A school cafeteria serves lunch to 500 pupils each day. If each pupil has a glass of milk, and two glasses make a pint, how many gallons of milk are used each day?

THE HARD QUESTION IS WHAT TO DO?

1. Mr. Carlson took his family for a ride on Sunday afternoon. He started with 10 gallons of gas in his car. When he returned, he had only $4\frac{1}{2}$ gallons left. How many gallons of gas did he use on the trip?

In solving this problem would you add, subtract, multiply, or divide? The right answer is "subtract."

In each of the following problems tell whether you would add, subtract, multiply, or divide.

2. James works in his father's grocery store $1\frac{1}{2}$ hours every afternoon after school. How many hours does he work during the 5 school days in a week?

3. Dick and Henry walked to Diamond Lake, which is $11\frac{1}{4}$ miles away. They averaged $3\frac{3}{4}$ miles an hour. In how many hours did they reach the lake?

4. Mrs. Hart bought $3\frac{1}{4}$ yards of dress goods for Ruth and $3\frac{5}{8}$ yards for Jennie. How many yards did she buy for both girls?

5. A restaurant used $38\frac{1}{2}$ lb. of bacon in one week. What was the average number of pounds used each day?

6. Tom feeds his pony 2 quarts of oats twice a day. How many days will 15 bushels of oats last?

7. Mr. Jackson averages $\frac{3}{4}$ mile a minute on an auto trip. What is his average speed an hour?

8. Lucy's skates cost \$2.75. Her mittens cost $\frac{1}{5}$ as much as the skates. How much did the skates and mittens cost together?

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 18 minutes. Your score will be twice the number of problems you solve correctly in the time allowed. Look in the box below to see how good your score is.

If a problem troubles you, ask yourself the questions you have learned to use in solving problems.

	Scale		Score
A	Ex.	=	10
B	Good	=	8
C	Fair	=	6
D	Poor	=	4 to 0

1. On Monday Carl gathered $2\frac{2}{3}$ dozen eggs; on Tuesday, $1\frac{1}{2}$ dozen; on Wednesday, $3\frac{1}{4}$ dozen. How many dozen eggs did he gather on the three days?

2. Many years ago people told time by burning candles. If a $7\frac{1}{2}$ inch candle burns at the rate of $\frac{3}{4}$ inch in an hour, how many hours will it burn?

3. Jim weighed $78\frac{1}{2}$ lb. on January 8. On February 8 he weighed $82\frac{1}{4}$ lb. How many pounds did he gain during the month?

4. One Saturday last fall Ralph went to his uncle's farm to gather hickory nuts. During the 3 hours that he worked he gathered $2\frac{1}{4}$ bushels. What part of a bushel did he average in 1 hour?

5. Bob's brother Jack is in high school. On Monday evening he studied $1\frac{1}{2}$ hours; Tuesday evening, 2 hr.; Wednesday evening, $1\frac{2}{3}$ hr.; Thursday evening, $2\frac{1}{2}$ hr.; and Friday evening, $1\frac{1}{6}$ hours. How many hours did he spend in studying on the 5 evenings?

WHAT DO YOU KNOW ABOUT MEASURES?

Copy the following exercises and fill the blanks.

1. The number in a dozen is ___.
2. In a gross there are ___ dozen.
3. There are ___ feet in a yard.
4. A foot is equal to ___ inches.
5. In a mile there are ___ feet.
6. In a year there are ___ days.
7. There are ___ hours in a day.
8. One minute equals ___ seconds.
9. A gallon is equal to ___ quarts.
10. A quart equals ___ pints.
11. There are ___ quarts in a bushel.
12. 1 T. = ___ lb.
13. A pound equals ___ oz.
14. In a square yard there are ___ sq. ft.
15. In a square 2 ft. by 2 ft. there are ___ sq. ft.
16. There are ___ pecks in a bushel.
17. From 8 A. M. to 8 P. M. is ___ hours.
18. One-tenth of a minute is ___ seconds.
19. 1 yd = ___ in.
20. 1 sq. ft. = ___ sq. in.
21. In a week there are ___ hours.
22. There are ___ minutes in a day.
23. Columbus discovered America in 1492. It has been ___ years since Columbus discovered America.

Your score is the number of correct answers.

THESE WILL TEST YOUR MEMORY

1. Add and check.

128	759	2433	8645	\$50.00
342	846	1466	2581	5.80
600	322	1992	3443	16.75
756	124	3887	2992	1.50

2. Subtract and check.

750	300	198	1485	\$15.75
196	75	109	969	6.28

3. Multiply and check.

25	250	180	345	\$10.80
10	20	96	807	12

4. Divide and check.

$6\overline{)714}$	$4\overline{)1440}$	$51\overline{)4590}$	$40\overline{)3640}$
$28\overline{)2968}$	$37\overline{)4107}$	$49\overline{)39690}$	$47\overline{)47000}$
$21\overline{)502}$	$19\overline{)8701}$	$39\overline{)50801}$	$47\overline{)39483}$
$7\overline{)1001}$	$62\overline{)6402}$	$28\overline{)8001}$	$77\overline{)80300}$

If you made mistakes on any exercise on this page, practice again on the examples in that exercise.

WINNERS' PAGE
For the pupils who made no mistakes on pages 233 and 234.

Number your paper. After the number of each problem write what you would do, add, subtract, multiply, or divide in working the problems.

1. A candy dealer makes $22\frac{1}{2}$ lb. of candy on Monday, $16\frac{1}{8}$ lb. on Tuesday, and $25\frac{3}{4}$ lb. on Wednesday. How many pounds of candy does he make in the three days?

2. Some second grade children in Hamilton school are to be brownies in a play. Each brownie costume takes $2\frac{1}{3}$ yd. of cambric. Forty-two yards of cambric were bought. How many brownie costumes can be made from this cloth?

3. A restaurant owner has 21 lb. of sugar on hand. It takes $\frac{3}{4}$ lb. to fill each bowl on the tables. How many sugar bowls can he fill with the sugar he has?

4. Helen spends 4 weeks at a summer camp. The first week she gains $1\frac{1}{2}$ lb. in weight; the second week, $\frac{5}{8}$ lb.; the third week, $2\frac{1}{4}$ lb.; the fourth week, $1\frac{7}{8}$ lb. How many pounds does she gain during the four weeks?

5. Bob and his sister Lucy went to visit their grandfather. While there they helped their grandfather pick apples. Bob picked $8\frac{1}{4}$ bu. and Lucy picked $3\frac{3}{8}$ bu. How many more bushels did Bob pick than Lucy?

6. A dealer put up $24\frac{1}{2}$ lb. of candy in $\frac{1}{2}$ lb. boxes. How many boxes did he need for the candy?

CHAPTER VI

DECIMALS

Decimal Fractions: Tenths

You have studied fractions called common fractions. They are in common use. But there is another kind of fractions called **decimal fractions.**

In writing such numbers as $3.25 you learned the decimal point separates the number of whole dollars (3) from the fractional part of a dollar (.25).

There are other uses for decimal fractions besides that of writing dollars and cents. Remember that the decimal point is very important.

Finding Tenths of a Whole Thing

1. Donald's candy bar was marked off in small squares. After he ate one square, it looked like the bar in the picture.

What part of the candy bar did Donald eat?

You can write the answer in two ways:

He ate $\frac{1}{10}$ of the candy bar.
He ate .1 of the candy bar.

In reading both answers, we say: "He ate one-tenth of the candy bar." $\frac{1}{10}$ **is a common fraction; .1 is a decimal fraction.** They mean the same, but .1 is easier to write.

2. Show how the candy bar looks after Donald has eaten 6 squares. What part of the candy bar is 6 squares? Write the answer in two ways.

THE GAME OF TENPINS

1. David got a game of tenpins one Christmas. The first time he shot the ball he struck 4 pins. How many tenths of all the pins did he strike? Write the answer in two ways.

2. David's father struck 7 pins in his first shot. What part did he strike? Write it in two ways.

People shorten "decimal fractions" by saying "decimals." Numbers like .3, .6, .7 are **decimals**.

Reading Tenths in Decimals

3. Grace's father bought a new automobile. The first day he drove it the speedometer looked like this: 7 8 4 The first two figures show the number of miles. The last figure shows tenths of a mile. We write the number 78.4 and read it, "Seventy-eight and four-tenths miles."

$78\frac{4}{10}$ is a mixed number. 78.4 is a **mixed decimal**. They mean the same thing and are read alike.

4. Instead of calling 78.4 a mixed decimal, we shorten it by saying "decimal." So 23.4, .5, 9.6, and 2.3 are all decimals. Read them.

1. Allen lives in Chicago. Every year he goes to Florida with his parents to spend the winter. He likes to read the time-table on the train and see how far he has gone from home. The time-table tells what the most important stations are.

The names of the stations are at the right. The numbers at the left show how many miles each station is from Chicago. The railroads use decimals to show parts of a mile.

The Time-Table

Miles	Station
0.0	Chicago
26.6	Chicago Heights
123.2	Danville
177.5	Terre Haute, Ind.
259.1	Princeton
286.5	Evansville
299.0	Henderson, Ky.
348.0	Nortonville
447.0	Nashville, Tenn.
598.0	Chattanooga
735.0	Atlanta, Ga.
838.0	Macon
944.0	Albany
1131.0	Jacksonville, Fla.
1430.6	West Palm Beach
1497.6	Miami

Read the time-table like this:

Chicago Heights is twenty-six and six-tenths miles from Chicago.

When you are reading a number and come to a decimal point, remember to say "and."

1. One day while Allen and his parents were in Atlanta, their friends took them for a drive. Mr. Lee set the speedometer at zero for the trip, so it read **0 0 0.** Every time they stopped to get out of the car, Allen read the number of miles.

Read the number of miles that each stopping place was from the starting point. Read also the **total** number of miles the speedometer showed at each stop.

Total	Trip	Stops
8349.0	00.0	At beginning of ride
8349.9	00.9	Service station
8360.4	11.4	Home of "Uncle Remus"
8375.5	26.5	Cotton fields
8388.6	39.6	Stone Mountain
8416.4	67.4	Peace Monument
8431.7	82.7	Druid Hills Club House

2. Allen's friends in Chicago sent him a record of the snowfall each month.

Month	Inches of Snowfall
November	.1
December	20.1
January	14.1
February	1.5

Read the number of inches of snow in Chicago each month.

Write the numbers, using common fractions.

3. Allen looked up the weather records of Miami and found that the rainfall there had been as follows. Read:

November	2.9 inches	January	2.5 inches
December	1.7 inches	February	1.8 inches

SHOWING TENTHS IN DRAWING

Each part of this rectangle is $\frac{1}{10}$ or .1 of the rectangle. The whole rectangle has in it $\frac{10}{10}$ or 1.0 (one and no tenths). When you read, you say one and no tenths, and you write it 1.0 in your work.

1. Draw on your paper 5 rectangles and divide each of them into tenths. Color parts of the rectangles so as to show the following numbers:

.1 .2 .4 .6 .8

2. Show the class that .2 is the same as $\frac{1}{5}$ and .4 is the same as $\frac{2}{5}$.

3. Fill these blanks and tell why your answer is right:

$.6 = \frac{\quad}{5}$ $.8 = \frac{\quad}{5}$

4. From what you have just shown on your drawings, you now can write what has been left out of the following table. Copy the table and write the numbers left out. Use your drawings if you need them.

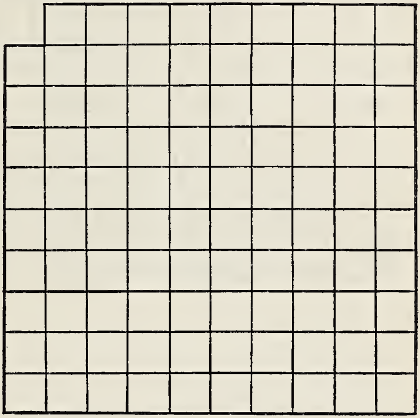
$.1 = \frac{\quad}{10}$	$.3 = \frac{\quad}{10}$	$.4 = \frac{\quad}{5}$	$1.0 = \frac{\quad}{5}$
$.2 = \frac{\quad}{10}$	$.5 = \frac{\quad}{10}$	$.4 = \frac{\quad}{10}$	$.8 = \frac{\quad}{5}$
$.2 = \frac{\quad}{5}$	$.5 = \frac{\quad}{2}$	$1.0 = \frac{\quad}{10}$	$.8 = \frac{\quad}{10}$
$.6 = \frac{\quad}{5}$	$.7 = \frac{\quad}{10}$	$.6 = \frac{\quad}{10}$	$.9 = \frac{\quad}{10}$

5. Copy the table given below and put in the right decimals.

$\frac{1}{5} =$.___	$\frac{2}{5} =$.___	$\frac{4}{5} =$.___	$\frac{2}{10} =$.___
$\frac{1}{2} =$.___	$\frac{3}{5} =$.___	$\frac{5}{5} =$.___	$\frac{10}{10} =$ ___.

SHOWING HUNDREDTHS ON DRAWING PAPER

1. Miss White had her pupils mark a large square sheet of drawing paper into 100 small squares all of the same size. They cut out one small square so that it looked like this picture. What part of the large square did they cut out?



You can write the answer in these two ways.

They cut out $\frac{1}{100}$ of the square. They cut out .01 of the square.

Both of these answers are read, "They cut out one-hundredth of the square." They mean the same thing, but it is quicker to write .01 than $\frac{1}{100}$.

2. Show how the large square looks after 5 of the small squares have been cut off. What part has been cut off? Write the answer as a common fraction and as a decimal. Read both of your answers.

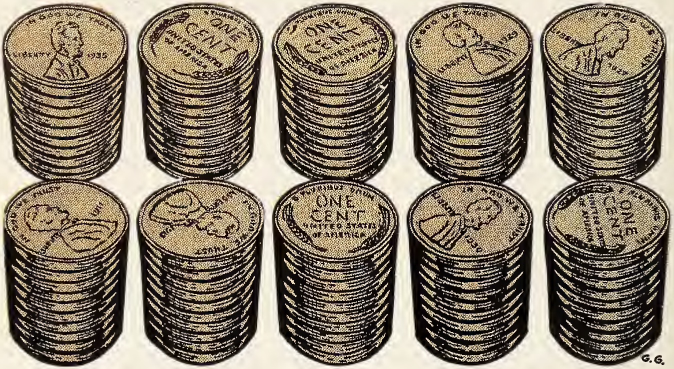
If two figures are written after the decimal point, you read them as hundredths.

3. Read these decimals:

.8	15.8	.18	.65	.5	.3	1.4	.25
.7	.11	.03	.41	.25	.1	5.61	5.2

Finding Hundredths of a Group of Things

A HUNDRED PENNIES



1. Grandfather gave Nora 100 pennies for her birthday. Nora put them in 10 piles, as in the picture. She wants to spend 10 of them for a set of paper dolls. What part of 100 is 10? Write the answer in two ways.

One hundred pennies are the same as one dollar.

2. She is going to give her little brother 5 pennies to buy marbles. What part of all the 100 pennies is she going to give him? Write it in two ways.

3. If Nora puts 50 pennies in her bank, what part of all the pennies will she put in her bank? Write the answer in two ways.

4. $\frac{1}{100}$ is a common fraction. .01 is a decimal fraction.

$\frac{5}{100}$ is a ____ fraction. .05 is a ____ fraction.

$\frac{50}{100}$ is a ____ fraction. .50 is a ____ fraction.

AS WE SEE THEM IN PRINT

You have seen that a square may be divided into hundredths, and that a dollar is made up of hundredths. We use hundredths in telling about many other things.

Read the following sentences and tell what they mean. When you read 3.51 remember to say, "Three and fifty-one hundredths." Say AND when you come to a decimal point.

1. The rainfall in New York City for each month during spring and summer was as follows:

March	3.51 inches	June	2.30 inches
April	5.76 inches	July	0.98 inches
May	3.64 inches	August	1.45 inches

2. An automobile tire advertised as 28×4.75 has a casing with 4.75 inches of open space inside for the inner tube.

3. Average farm wages in this country were $3.56 a day in 1920. In 1930 they were $2.42 a day.

4. An average carload of corn weighs 37.31 tons. An average carload of potatoes weighs 17.71 tons.

5. Insurance companies say that a child 10 years old may expect to live 48.72 years longer.

6. The largest diamond ever seen was found in South Africa. It weighed about 1.75 pounds.

7. Fred had 100 problems to solve in arithmetic. He got .94 of them right. He got .06 of them wrong.

8. In 1911 the automobile speed record at Indianapolis was 74.59 miles an hour; in 1920, 88.50 miles; in 1926, 95.88 miles; in 1930, 100.44 miles; in 1932, 104.35 miles; and in 1935, 106.24 miles.

DIFFERENT WAYS OF SAYING THE SAME THING

You have learned that a fraction can be changed to higher or lower terms without changing its value. For example, you can change $\frac{4}{8}$ to lower terms and get $\frac{2}{4}$ or $\frac{1}{2}$, and the value of all three fractions is the same, or you can change $\frac{1}{3}$ to higher terms and get $\frac{2}{6}$ or $\frac{4}{12}$, and the value of these three fractions is the same. You can do this with decimals by writing them in other decimal forms or as common fractions. Writing decimals in different ways helps you to see how much they really are.

1. Prices of gasoline are not written in the same way in all parts of the United States. Tom went on a long trip with his father last summer. Read these price signs that he saw at filling stations:

Gas $15\frac{1}{2}$¢ plus tax	Gas 15.5¢ plus tax
Gas $19\frac{1}{10}$¢	Gas 19.1¢
Gas—Ethyl $22\frac{3}{10}$¢	Gas—Ethyl 22.3¢

Tom's father explained that 15.5¢ is the same price as $15\frac{1}{2}$¢.

2. Draw on paper a large square in which there are 10 rows of small squares and 10 small squares in each row. The small squares must all be the same size. Each small square is what part of the large square? A row of squares is how many hundredths of the large square? Write this first as a common fraction, then as a decimal. Two rows of squares are how many hundredths of the large square? Write this as a common fraction and as a decimal.

AS NORA DOES

Because decimals can be more quickly written and more easily used in figuring, they are used to express dollars and cents. The one-cent coin is often called a penny. Look at the following sentences and see two ways of writing each number of cents that Nora used, when her grandfather gave her 100 cents.

1. Nora's grandfather gave her 100 pennies. A penny is $\frac{1}{100}$ of a dollar. He gave her $\frac{100}{100}$ of a dollar, or \$1.00.

2. Nora wants to spend 10 pennies for a set of paper dolls. She wants to spend $\frac{10}{100}$ of a dollar. She wants to spend \$.10.

3. Nora is going to give her little brother 5 pennies. She will give him $\frac{5}{100}$ of a dollar. She will give him \$.05.

4. If Nora saves 50 pennies, she will save \$.50.

You can write cents as hundredths of a dollar. You may write 25¢ as \$.25, and 8¢ as \$.08. Remember you must have two figures after the decimal point for hundredths. If the number of cents is less than 10, use zero in tenths' place after the decimal point; then write the number of cents.

Write as decimals.

5.	2 cents	15 cents	54 cents	18 cents	95 cents
6.	4 cents	1 cent	40 cents	7 cents	21 cents
7.	33 cents	52 cents	3 cents	70 cents	85 cents
8.	\$ $2\frac{15}{100}$	\$ $\frac{80}{100}$	\$ $\frac{35}{100}$	\$ $\frac{53}{100}$	
9.	\$ $\frac{9}{100}$	\$$3\frac{75}{100}$	\$$1\frac{25}{100}$	\$ $\frac{98}{100}$	
10.	\$$14\frac{90}{100}$	\$$5\frac{16}{100}$	\$$2\frac{5}{100}$	\$$6\frac{10}{100}$	

1. Draw a large square like the one you made at the bottom of page 244. Mark it into 100 small squares all of the same size.

2. Color .05 of the large square. How many squares should you color? Remember that each small square is a hundredth. Do you see that .05 is the same as $\frac{1}{20}$? Why is this true?

3. Color .10 of the large square. Do you see that .10 is the same as $\frac{1}{10}$? Why is this true?

4. Color .20 of the square.
   .20 is the same as $\frac{?}{10}$, or ___.
   .20 is the same as $\frac{?}{5}$.

5. Color .25 of the square.
   .25 is the same as $\frac{?}{4}$.

6. Color .30 of the square.
   .30 is the same as $\frac{?}{10}$, or ___.

7. Color .40 of the square.
   .40 is the same as $\frac{?}{10}$, or ___.
   .40 is the same as $\frac{?}{5}$.

8. Color .50 of the square.
   .50 is the same as $\frac{?}{10}$, or ___.
   .50 is the same as $\frac{?}{4}$.
   .50 is the same as $\frac{?}{2}$.

9. Color .60 of the square.
   .60 is the same as $\frac{?}{10}$, or ___.
   .60 is the same as $\frac{?}{5}$.

10. Color .70 of the square.
   .70 is the same as $\frac{?}{10}$, or ___.

11. Color .75 of the square.
   .75 is the same as $\frac{?}{4}$.

From the drawing you have just made you will see that these facts are true about decimals:

.10 = .1	.40 = .4	.70 = .7
.20 = .2	.50 = .5	.80 = .8
.30 = .3	.60 = .6	.90 = .9

Your drawing shows the following facts:

$\frac{1}{2}$ = .5 or .50	$\frac{3}{5}$ = .6 or .60	$\frac{3}{4}$ = .75
$\frac{1}{5}$ = .2 or .20	$\frac{4}{5}$ = .8 or .80	1 = 1.0 or 1.00
$\frac{2}{5}$ = .4 or .40	$\frac{1}{4}$ = .25	

Copy the exercise below and fill in the empty spaces. Use "larger than," "smaller than," or "the same as" to write what is true. This is how it should be done: .80 is the same as .8. If you need help, make a drawing and find what value the decimal has.

1.	.7 is ________ .8	1.0 is ________ 1.1
2.	.09 is ________ .10	.60 is ________ .6
3.	1.1 is ________ .99	.9 is ________ .80
4.	1.9 is ________ .18	.80 is ________ 1
5.	1.01 is ________ .1	.03 is ________ 1

6. Copy the decimals below in the order of their size, beginning with the largest.

3.6 .9 .01 1. .16 .25 2.5 .80

Write the following as decimals:

7.	**8.**
Three-tenths	Eighteen-hundredths
One and one-tenth	Six and seven-hundredths
One-hundredth	Ten and one-hundredth
Nine-hundredths	Ten and three-fourths
Five and one-half	Twenty-five and one-fourth

THE BOOKS JANE BOUGHT

1. Jane paid \$1.22 for a geography, \$.65 for an arithmetic, and \$.10 for paper and pencils. How much did she pay for all? \$1.22 + \$.65 + \$.10 = ?

\$1.22
.65
.10
\$1.97

Write the numbers under each other in a column.
Keep decimal points under decimal points.
Keep tenths under tenths, and hundredths under hundredths.
Add.
Write the decimal point as soon as you come to it in adding.

Jane paid \$1.97 for the school supplies.

2. Sid and his father took 3 automobile trips last year. On the first trip they went 210.6 miles; on the second trip, 186.1 miles; on the third trip, 283.9 miles. How many miles did Sid and his father travel on the 3 trips?

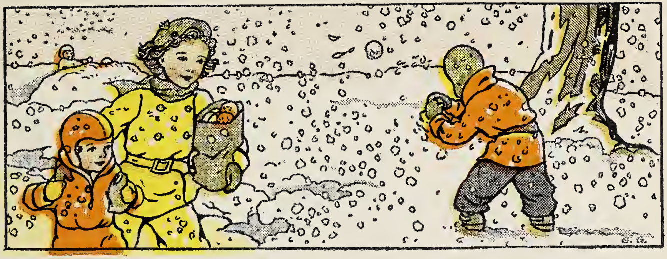
210.6
186.1
283.9
680.6

Copy the numbers in a column.
Keep decimal points under decimal points.
Keep tenths under tenths.
Add.
Write the decimal point as soon as you come to it in adding.

Sid and his father traveled 680.6 miles.

3. Add: \$210.50 + \$201.01 + \$600.02 + \$800.07

4. Add: 36.8 + 269.3 + 158.7 + 98.8



FUN IN WINTER

5. A snowstorm in January lasted four days. On the first day 5.5 inches of snow fell; on the second day 6.25 inches fell; on the third day 3.1 inches fell; and on the fourth day .75 inches of snow fell. How many inches of snow fell in the four days?

$$\begin{array}{r@{.}l} 5&5 \\ 6&25 \\ 3&1 \\ &75 \\ \hline 15&60 \end{array}$$

Copy the numbers in a column.
Keep the decimal points under each other.
Keep tenths under tenths, and hundredths under hundredths.
Add hundredths. Write 0.
Add tenths. Write 6.
Write decimal point.
Add whole numbers. Write 15.

In four days 15.60 inches of snow fell, or 15.6.

When adding decimals, write the numbers under each other in a column. Keep decimal points under decimal points. Keep tenths under tenths, and hundredths under hundredths. Then add. Write the decimal point as soon as you come to it.

Copy, add, and check.

1.	.3 .1 .5	2.	.8 .6 .4	3.	.3 .35 .21	4.	.36 .29 .71
5.	.05 .01 .02	6.	.06 .07 .05	7.	1.2 3.4 5.3	8.	5.4 6.8 7.5
9.	2.05 6.07 9.09	10.	1.75 .07 .5 3.01	11.	.08 7.15 8. .74	12.	19. 15.1 .07 120.
13.	.91 .06 5. 47.06	14.	.08 5.7 14. .6	15.	.33 1.02 143.01 .8	16.	5.05 .8 10.01 500.

Copy in columns, add, and check. Be sure to keep decimal points in a straight line.

17. 9.21 + .05 + 1.2 + 10.
18. 16. + 4.04 + 45.7 + .3
19. 1.18 + 23.09 + 7.6 + 6.02
20. 124.16 + 89.7 + 320. + .75
21. .07 + 90. + 53.7 + .05
22. 100. + .01 + 15.5 + .3 + 15.

Write these common fractions as decimals and then add them.

23. $\frac{1}{5}+\frac{1}{2}+\frac{4}{5}$ 24. $\frac{3}{5}+\frac{3}{5}+\frac{1}{10}$ 25. $\frac{3}{4}+\frac{4}{5}+\frac{1}{2}$

Sometimes you have problems with tenths in the subtrahend and no decimals in the minuend.

1. On an auto trip Mr. Groves had a flat tire. He was 12.8 miles from home and on his return trip. The trip from home and back covered 2340 miles. How many miles did he go before he had a flat tire? $2340 - 12.8 = ?$

2340.0
12.8
2327.2

Place a decimal point and 0 after 2340.
Write 12.8 under 2340.0. Place decimal point under decimal point and tenths under tenths.
Subtract. Write the decimal point when you come to it in subtracting.

Mr. Groves went 2327.2 miles without a flat tire.

In the next problem you subtract dollars and cents.

2. Fred had \$17 in the school bank. He drew out \$5.85 to pay for repairs on his bicycle. How much money did he still have in the bank? \$17 − \$5.85 = ?

When subtracting decimals, keep decimal point under decimal point. Keep tenths under tenths and hundredths under hundredths. Place a decimal point and zeros after a whole number, if needed. Subtract. Write the decimal point as soon as you come to it in subtracting.

Copy, subtract, and check.

3.	.9	.8	.28	.56	.65
	.4	.8	.06	.34	.61
4.	7.4	9.6	8.0	5.	14.6
	2.7	6.6	3.7	1.3	7.17

Copy, subtract, and check. Place a decimal point and zeros after any whole number, if needed.

1.	7.2	21.	67.09	45.34	26.84
	3.19	9.82	23.6	6.7	9.63

Copy in columns, subtract, and check. Be sure to keep decimal point under decimal point.

2. $93.15 - 28.4 =$
3. $61.10 - 34.95 =$
4. $5 - 2.98 =$
5. $.1 - .09 =$
6. $32.05 - 10 =$
7. $16 - 7.03 =$
7. \$13 from \$15.95 =
8. \$.45 from \$10 =

Keeping Up in What You Have Learned

1. Add and check.

673	390	548	849	645	618	857
806	489	937	473	468	965	179

2. Subtract and check.

715	1219	698	839	796	544	855
209	746	473	554	329	385	387

3. Multiply and check.

340	652	149	807	167	375	716
20	63	28	56	49	84	37

4. Divide and check.

$35\overline{)7105}$ $8\overline{)956}$ $80\overline{)4640}$ $7\overline{)3283}$ $12\overline{)10704}$

$29\overline{)5510}$ $9\overline{)5728}$ $14\overline{)8512}$ $39\overline{)1417}$ $68\overline{)3543}$

HOW GOOD IS YOUR MEMORY?

1. Add and check.

$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{7}{8}$	$2\frac{1}{2}$	$4\frac{3}{4}$	$125\frac{1}{3}$
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$3\frac{1}{4}$	$5\frac{3}{8}$	$6\frac{4}{5}$
		$\frac{1}{4}$	$\frac{1}{2}$			

2. Subtract and check.

$\frac{5}{8}$	$\frac{3}{8}$	$6\frac{1}{3}$	$4\frac{1}{2}$	$12\frac{1}{4}$	$1\frac{1}{5}$	$5\frac{3}{4}$
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{6}$	$2\frac{3}{4}$	$12\frac{1}{8}$	$\frac{3}{10}$	$1\frac{3}{4}$

3. Multiply and check.

$\frac{1}{3}\times 2=$ $\quad$ $\frac{1}{5}\times 5=$ $\quad$ $8\times\frac{1}{4}=$ $\quad$ $\frac{2}{3}\times\frac{3}{4}=$ $\quad$ $4\frac{7}{8}\times 8=$

$3\frac{1}{3}\times\frac{1}{3}=$ $\quad$ $\frac{1}{6}\times 6\frac{6}{7}=$ $\quad$ $5\frac{1}{2}\times 3\frac{1}{3}=$

$$\begin{array}{r} 25\frac{1}{2} \\ \underline{10} \end{array}$$

4. Divide and check.

$5\div\frac{1}{3}=$	$6\div\frac{1}{6}=$	$5\div 2\frac{1}{2}=$	$4\frac{3}{4}\div\frac{1}{4}=$
$8\div 1\frac{1}{4}=$	$5\div\frac{1}{5}=$	$5\frac{1}{5}\div 2\frac{1}{4}=$	$12\div 9=$
$2\frac{3}{4}\div 2=$	$\frac{1}{2}\div\frac{1}{4}=$	$4\frac{1}{2}\div 1\frac{1}{4}=$	$8\div\frac{1}{4}=$
$1\frac{1}{8}\div\frac{1}{4}=$	$\frac{7}{8}\div\frac{5}{9}=$	$8\frac{1}{2}\div 4\frac{1}{5}=$	$\frac{5}{8}\div 8=$
$6\frac{1}{4}\div 3=$	$\frac{8}{10}\div\frac{1}{9}=$	$\frac{5}{8}\div\frac{3}{10}=$	$\frac{3}{4}\div\frac{1}{8}=$

FINDING OUR WEAK SPOTS

This test will help you to find your weak spots in writing and adding decimals. Do your work on a folded paper.

1. Write in words.

1.3 .45 .2 6.33 .04

2. Write as decimals.

Six-tenths
Fifteen-hundredths
Four-hundredths
Six and three-tenths
Sixty-two and seventy-five hundredths

3. Write as decimals.

$\frac{1}{2}$ $\frac{1}{5}$ $\frac{3}{4}$ $\frac{3}{100}$ $1\frac{8}{10}$

4. Write as common fractions or mixed numbers.

.36 1.5 6.75 4 \$2.25

5. Add and check.

.3	.2	.3	.7	.6	.2
.5	.4	.3	.4	.4	.1
.1	.2	.3	.5	.5	.9

6. Add and check.

.22	.13	.15	.12	.44	.05
.15	.33	.35	.65	.65	.18
.02	.10	.25	.14	.75	.06

7. Add and check.

1.05	2.1	2.50	\$10.50
8.02	6.175	.75	2.20
2.04	.38	8.8	.70

CURING OUR WEAK SPOTS

If you made mistakes in any exercise on page 254, do the exercise of the same number on this page.

1. Write in words.

2.5	.24	.6	8.75	.08

2. Write as decimals.

Four-tenths — Twelve-hundredths
Two-hundredths — Five and four-tenths
Forty and twenty-five hundredths

3. Write as decimals.

$\frac{1}{4}$	$\frac{3}{5}$	$\frac{3}{10}$	$\frac{9}{100}$	$2\frac{6}{10}$

4. Write as common fractions or mixed numbers.

.75	8.4	4.45	.2	$5.55

5. Add and check.

.4	.5	.3	.9	.5	.6
.4	.1	.2	.5	.5	.3
.1	.2	.3	.2	.5	.5

6. Add and check.

.25	.12	.25	.40	.75	.02
.30	.10	.15	.35	.33	.08
.12	.50	.10	.05	.88	.02

7. Add and check.

10.02	4.2	3.50	$10.65
7.05	7.162	.68	1.30
5.05	.25	7.3	3.40

WINNERS' PAGE
For the pupils who made no mistakes on page 254.

1. Alice mailed four packages. The postage on them was: \$.21, \$.18, \$.26, and \$.14. She also bought a 25-cent book of stamps. How much did she pay for all?

Often you have a whole number written with a decimal point. In the next problem you have a whole number (3) without a decimal point. You can write it 3. or 3.0 or 3.00 when you add. Why?

2. While Ted was at Boy Scout camp last summer, he took a hike every day. One week, he kept account of the miles he hiked. On Monday he hiked 1.6 miles, Tuesday 2.8 miles, Wednesday 2.75 miles, Thursday 3 miles, Friday 3.25 miles, and Saturday 2.5 miles. How many miles did he hike in the six days?

A decimal point can be placed after any whole number and zeros can be written after the decimal point without changing the value of the whole number.

3. Pennsylvania has three important canals. Their lengths are 98.88 miles, 47.46 miles, and 60 miles. What is the total number of miles in these canals?

4. The distance by train from New York to Chicago is 908.2 miles. From Chicago to Los Angeles it is 2,225.9 miles. What is the total distance from New York to Los Angeles by a train over this route?

FINDING OUR WEAK SPOTS

This test will help you find your weak spots in subtraction of decimals. Do your work on a folded paper.

Subtract and check.

1.	.6	.5	.09	.07	.68	.25
	.2	.4	.05	.06	.38	.20
2.	.90	.51	.8	.5	15.8	27.5
	.48	.34	.275	.422	10.9	20.95

3. $200 - 145.06 =$ $\quad$ $28 - 13.05 =$
   $67.07 - 23.40 =$ $\quad$ $13.1 - 6.07 =$

4. $150 - 47.6 =$ $\quad$ $260 - 190.5 =$
   $85.1 - 68 =$ $\quad$ $10.8 - 8.9 =$

If you made mistakes in any exercise, do the exercise of the same number below.

Remedial Exercises

CURING OUR WEAK SPOTS

Subtract and check.

1.	.8	.7	.06	.09	.79	.64
	.3	.1	.02	.05	.19	.60
2.	.40	.92	.6	.5	87.5	43.3
	.19	.58	.138	.311	80.6	40.76

3. $50 - 10.33 =$ $\quad$ $65 - 10.02 =$
   $33.06 - 11.70 =$ $\quad$ $67.4 - 7.38 =$

4. $165 - 48.2 =$ $\quad$ $290 - 200.3 =$
   $92.2 - 39 =$ $\quad$ $12.5 - 2.9 =$

WINNERS' PAGE
For the pupils who made no mistakes on page 257.

1. Boys' leather coats were marked in a store as shown in the picture above. How much less was each leather coat today than last fall?

2. Carl found that a fountain pen which he wanted was marked, "$3.98, Regular $7 value." How much lower was the marked price than the regular value?

3. The distance from New York to St. Louis is 1154.5 miles by one railroad route and 1052.3 miles by another. How much shorter is the distance by the second route?

4. Jean is going with her mother on a railroad journey to New Orleans. They will start from Cincinnati, which is 921.4 miles from New Orleans by the route they take. They plan to stop at Chattanooga, 338 miles from Cincinnati. How much farther have they to go after they stop at Chattanooga?

5. The meter is 39.37 inches long. A meter is how much longer than a yard?

GILBERT AT THE DENTIST'S OFFICE

1. Gilbert had the dentist fill 3 teeth last Saturday. The dentist charged him \$3.75 for each filling. How much did Gilbert owe the dentist for this work? $3 \times \$3.75 = ?$

$$\begin{array}{r} \$\ 3.75 \\ 3 \\ \hline \$11.25 \end{array}$$

The multiplicand is \$3.75. It has 2 decimal places.
The multiplier is 3. It has no decimal places.
Multiply, just as with whole numbers.
Put a decimal point in the product two places from the right. You have done this before with money numbers.
Gilbert owed the dentist \$11.25.

Here is a problem in which the multiplicand is a whole number and the multiplier is a decimal.

2. The fifth grade wrote a spelling test of 80 words. Ted spelled .9 of them right. How many words did he spell right? $.9 \times 80 = ?$

$$\begin{array}{r} 80 \\ .9 \\ \hline 72.0 \end{array}$$

The multiplicand is 80. It has no decimal places.
The multiplier is .9. It has one decimal place.
Multiply just as with whole numbers.
Put a decimal point in the product, one place from the right.
Ted spelled 72 words right in the test.

3.
$$\begin{array}{r} \$6.75 \\ 4 \\ \hline \end{array} \qquad \begin{array}{r} \$2.87 \\ 6 \\ \hline \end{array} \qquad \begin{array}{r} \$3.21 \\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 220 \\ .8 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 200 \\ .5 \\ \hline \end{array} \qquad \begin{array}{r} 302 \\ .4 \\ \hline \end{array} \qquad \begin{array}{r} 607 \\ .8 \\ \hline \end{array} \qquad \begin{array}{r} 500 \\ .9 \\ \hline \end{array}$$

Sometimes you have problems in which both the multiplicand and the multiplier are decimals. Here is one of that kind.

1. When Mr. Dean drove to the city Saturday, he averaged 32.6 miles an hour. How far did he drive in 2.5 hours? $2.5 \times 32.6 = ?$

$$\begin{array}{r} 32.6 \\ 2.5 \\ \hline 1630 \\ 652 \\ \hline 81.50 \end{array}$$

The multiplicand is 32.6. It has 1 decimal place.

The multiplier is 2.5. It has 1 decimal place.

Multiply just as with whole numbers.

Point off 2 decimal places from the right. There are always as many decimal places in the product as in both numbers multiplied.

Mr. Dean drove 81.50 miles in 2.5 hours.

Remember that $.50 = .5$. The answer may be written 81.5 miles.

2. On his return home, Mr. Dean used another road. He averaged 37.2 miles an hour for 2.25 hours. How far did he drive on his return trip?

When multiplying decimals, have as many decimal places in the product as there are decimal places in both the multiplicand and the multiplier. Begin at the right to point off decimal places. Cross off zeros at the end of the product after you have written the decimal point.

3. Driving to his summer cottage takes Mr. Dean 3.7 hours. He averages 35 miles an hour. How many miles is this trip to the cottage?

Explaining Decimal Points in Multiplication

The following examples are done correctly. Look at them carefully, and tell why the decimal points are placed where they are in the products.

1.

6.3	23.2	4.5	4.65
7	.8	.6	.8
44.1	18.56	2.70	3.720

2.

76.8	$16.36	361	5.8
.5	24	.61	3.2
38.40	6544	361	116
	3272	2166	174
	$392.64	220.21	18.56

EXAMPLES TO FINISH

In the following examples the numbers are multiplied correctly, but there are no decimal points in the products. Copy the products and put decimal points where they belong.

3.

.73	19.3	62.8	17.65	356
5	.6	.5	6	.3
365	1158	3140	10590	1068

Copy and multiply.

4. $5 \times .1 =$ $\quad 3 \times .03 =$ $\quad 7 \times .4 =$ $\quad 9 \times .05 =$

5. $7 \times .9 =$ $\quad 8 \times .05 =$ $\quad .3 \times 17 =$ $\quad .6 \times 45 =$

6.

30	4.6	3.65	242
.5	5	7	.19

7.

238	36	19.6	18.7
.11	.24	15	2.8

Copy and multiply.

1.	$7 \times .2 =$	$8 \times .06 =$	$5 \times .9 =$
2.	$4 \times .08 =$	$6 \times 1.4 =$	$3 \times 4.3 =$
3.	$.5 \times 18 =$	$.2 \times 59 =$	$.01 \times 56 =$

4.	$\begin{array}{r} 87 \\ \underline{.2} \end{array}$	$\begin{array}{r} 5.8 \\ \underline{15} \end{array}$	$\begin{array}{r} 1.14 \\ \underline{42} \end{array}$	$\begin{array}{r} 230 \\ \underline{.16} \end{array}$
5.	$\begin{array}{r} 75 \\ \underline{.8} \end{array}$	$\begin{array}{r} 46 \\ \underline{4.8} \end{array}$	$\begin{array}{r} 6.5 \\ \underline{6.7} \end{array}$	$\begin{array}{r} 21.6 \\ \underline{24} \end{array}$
6.	$\begin{array}{r} 3\ 83 \\ \underline{.34} \end{array}$	$\begin{array}{r} 10.7 \\ \underline{3.6} \end{array}$	$\begin{array}{r} 7.3 \\ \underline{10} \end{array}$	$\begin{array}{r} .36 \\ \underline{10} \end{array}$

7.	$10 \times 4.74 =$	$.25 \times \$328 =$	$.75 \times \$64 =$
8.	$2.9 \times 5.8 =$	$3.24 \times 152 =$	$7.3 \times 94 =$
9.	$200 \times 32.6 =$	$.08 \times 347 =$	$10 \times 3.11 =$
10.	$.61 \times 98 =$	$100 \times 6.6 =$	$7.2 \times 7.4 =$
11.	$100 \times 4.23 =$	$40 \times 18.2 =$	$.03 \times 43 =$
12.	$8.2 \times 527.1 =$	$56 \times \$30.98 =$	$.04 \times \$574 =$

13. Multiply 13.5 by 64

14. Multiply $23.75 by 24

15. Multiply 257 by .19

16. Multiply 100 by 2.6

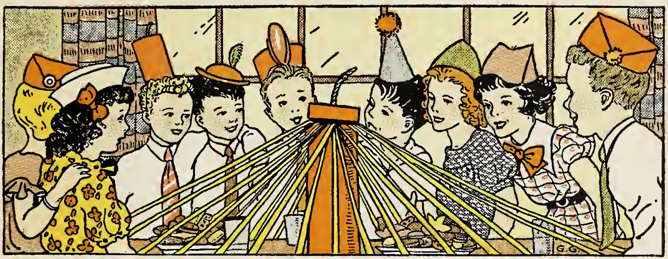
17. Multiply 4.86 by 100

18. Multiply .25 by 10

19. Multiply .01 by 100

20. Multiply 6.72 by 31

> **To multiply decimals, multiply the numbers just as if there were no decimals. Then point off as many decimal places in the product as there are decimal places in both numbers multiplied.**



A FOURTH OF JULY PARTY

1. Mabel has invited 23 boys and girls to a Fourth of July party. Her mother is going to buy paper caps for them to wear. The caps cost $.11 each. What will all the caps cost? Remember to buy a cap for Mabel.

2. Party favors will cost $.45 a dozen. What will it cost to buy a favor for each boy and girl at the party?

3. Mabel's mother will buy some assorted cookies at the store to serve at the party. They cost $.28 a pound. She needs 6 pounds. How much will the cookies cost?

4. Mabel wants to give a candy cane to every child. Canes of the size she likes cost $.08 each. What will the 24 candy canes cost?

5. Mabel's mother has ordered 5 quarts of ice cream to serve at the party. What will it cost at $.45 a quart?

6. The children are going to have a parade and march around the neighborhood. They will march once around a square park that is .25 mile on each side. How many miles will they march?

A Short Way to Multiply Decimals by 10

SHORT CUTS SAVE TIME

You learned to multiply whole numbers by 10, by adding 0 to the multiplicand, like this: $10 \times 35 = 350$.

Here is a short way to multiply decimals by 10.

1. A motor bus averages 36.8 miles an hour. How many miles will it go in 10 hours, if it keeps the same average? $10 \times 36.8 = ?$

$$\begin{array}{r} 36.8 \\ 10 \\ \hline 368.0 \end{array}$$

Multiply and point off.
The multiplicand is 36.8.
The product is 368.
The multiplying has moved the decimal point one place to the right.

2. Our school has 10 copies of the "Desk Dictionary." They cost \$2.69 each. What did they all cost? $10 \times \$2.69 = ?$

$$\begin{array}{r} \$2.69 \\ 10 \\ \hline \$26.90 \end{array}$$

In what way is the product like the multiplicand? In what way is it different?

To multiply a decimal by 10, move the decimal point one place to the right.

In the following examples the multiplying is done the short way: $10 \times 2.6 = 26$ $\quad 10 \times .34 = 3.4$

Number your paper from 3 to 8. Think what the product is in each example and write it.

3. $10 \times .06 =$
4. $10 \times .25 =$
5. $10 \times .3 =$
6. $10 \times 1.6 =$
7. $10 \times .7 =$
8. $10 \times 26.4 =$

ANOTHER SHORT CUT

You have learned to multiply a decimal by 10 by moving the decimal point one place to the right.

$10 \times .04 = .4$ $\qquad$ $10 \times 2.5 = 25$

Watch what happens to the decimal point when you multiply a decimal by 100.

1. Mr. Burns sold 100 bushels of oats at $.37 a bushel. How much did he receive for the oats? $100 \times \$.37 = ?$

$ .37
100
$37.00

Multiply and point off. How do the product and multiplicand differ?

The multiplying has moved the decimal point two places to the right.

Mr. Burns received $37 for his oats.

2. A city mailman walks 2.5 miles on every trip. How many miles does he walk on 100 trips? $100 \times 2.5 = ?$

$$\mathbf{2.5 = 2.50}$$
$$\mathbf{100 \times 2.50 = 250}$$

You cannot move the decimal point two places to the right until you have put a 0 in hundredths' place. Make your multiplicand 2.50.

Now multiply by moving the decimal point two places to the right.

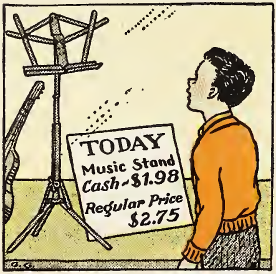
The mailman walks 250 miles in 100 trips.

To multiply a decimal by 100, move the decimal point two places to the right. You may need to write zero before you can move the decimal point two places.

Multiply each number by 100 by the short way:

3. 3.20 .87 .4 8.3 .07 34.25

MORE PROBLEMS WITH DECIMALS



1. Joe wants to buy a music stand to use in the school orchestra. The kind he wants is shown in a window. It is marked as you see in the picture. How much cheaper will it be for him to pay cash today than to pay the regular price?

2. Paul bought a 10-pound pail of candy for $1.98. He put it in bags containing a pound each, and sold them for $.25 apiece. What was his profit on the candy?

3. In the United States a sea mile is 6080.27 feet in length. How much longer is it than a land mile, which is 5280 feet in length?

4. Mr. Sloan had planned to buy a new tire for his Ford today and another one next week. When he saw this sign in a window this morning, he decided to buy both tires today. What did he pay for them? What would they have cost if he had bought one tire today and the other next week?

5. There are 16.5 feet in a rod. How many feet of fencing will be needed to go around a square chicken yard 4 rods on a side?

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 18 minutes. Your score will be twice the number of problems you solve correctly in the time allowed.

If a problem troubles you, ask yourself the questions you have learned to use in solving problems.

Scale		Score
A Ex.	=	12
B Good	=	10
C Fair	=	8 or 6
D Poor	=	4 to 0

1. Peggy is going to buy a new gymnasium outfit. The suit will cost \$1.95, the shoes \$1.45, and the socks, 60¢. How much will the whole outfit cost?

2. Ruth gets \$.65 a week for her spending money. How much money does she get in 52 weeks?

3. Tom has a garden plot at school that is 12.9 feet long. How much longer or shorter than 12 feet 9 inches is Tom's garden plot?

4. In 1 rod there are 5.5 yards. By changing the position of the decimal point, write the number that shows how many yards there are in 100 rods.

5. In the New York Six-Day Bicycle Race in 1930, the fastest riders averaged 388.48 miles a day. How many miles did they go in the whole time?

6. At a sale in a drug store Mrs. Mills bought 1 dozen cakes of soap for \$.69, a toothbrush for \$.34, a tube of tooth paste for \$.17, and a nailbrush for \$.09. What was the cost of all these articles?

A SEASON TICKET

1. Morris bought a season ticket for six basket ball games. He paid $1.38 for the six games. What was the cost of a game at this rate? $\$1.38 \div 6 = ?$

```
     $ .2 3
  6)$1.3 8
     1 2
       1 8
       1 8
```

Write the decimal point in the quotient just above the decimal point in the dividend.
Divide as you do with whole numbers.
Morris paid $.23 a game.

Check

```
 $ .23
     6
 $1.38
```

2. An air pilot flew 295.2 miles in 3 hours. What was his average speed an hour? $295.2 \div 3 = ?$

```
      9 8.4
  3)2 9 5.2
    2 7
      2 5
      2 4
        1 2
        1 2
```

Write the decimal point in the quotient just above the decimal point in the dividend.
Divide as you do with whole numbers.
The pilot's speed was 98.4 miles an hour.

3. Mac sold 15 bunches of carrots for $1.35. If he sold each bunch at the same price, what did he get for each bunch? $\$1.35 \div 15 = ?$

```
        $ .0 9
  1 5)$1.3 5
        1 3 5
```

Write the decimal point in the quotient.
Divide as with whole numbers.
$13 \div 15 = ?$ Write 0 in the quotient.
$135 \div 15 = 9$. Write 9.
Mac got $.09 for each bunch.

4. Ethel paid \$5.00 for a piece of silk 4 yards long. What price was this a yard? $\$5.00 \div 4 = ?$

$$\begin{array}{r} \$1.25 \\ 4\overline{)\$5.00} \\ \underline{4} \\ 1\,0 \\ \underline{8} \\ 2\,0 \\ \underline{2\,0} \end{array}$$

Write the decimal point in the quotient.
Divide.
Ethel paid \$1.25 a yard for the silk.
Check: $4 \times \$1.25 = \$5.00$

Check

$$\begin{array}{r} \$1.25 \\ \underline{4} \\ \$5.00 \end{array}$$

5. Dr. Ryan drove his automobile 65.5 miles in 2 hours. What was his average speed an hour? $65.5 \div 2 = ?$

$$\begin{array}{r} 32.75 \\ 2\overline{)65.50} \\ \underline{6} \\ 5 \\ \underline{4} \\ 1\,5 \\ \underline{1\,4} \\ 1\,0 \\ \underline{1\,0} \end{array}$$

Write the decimal point in the quotient.
Divide. $6 \div 2 = 3$. Write 3.
There is no remainder. Bring down 5.
Divide. $5 \div 2 = 2$ and 1 remainder.
Divide. $15 \div 2 = 7$ and 1 remainder.
Write a zero in the dividend and bring it down.
Divide. $10 \div 2 = 5$
Dr. Ryan drove 32.75 miles an hour.

When dividing a decimal by a whole number, first write the decimal point in the quotient just above the decimal point in the dividend. Then divide. If there is a remainder place zeros in the dividend after the decimal point and go on dividing as in whole numbers.

6. Divide and check. $\quad 8\overline{).96} \quad\quad 5\overline{)62.5}$

The following examples are worked correctly. Look at them carefully and tell why the decimal points are placed where they are in the quotients.

1. $$\begin{array}{r} \$\ .50 \\ 13\overline{)\$6.50} \\ \underline{65} \\ 0 \end{array}$$

2. $$\begin{array}{r} 4.1 \\ 4\overline{)16.4} \\ \underline{16} \\ 4 \\ \underline{4} \end{array}$$

3. $$\begin{array}{r} 3.2 \\ 25\overline{)80.0} \\ \underline{75} \\ 50 \\ \underline{50} \end{array}$$

4. $$\begin{array}{r} .03 \\ 33\overline{).99} \\ \underline{99} \end{array}$$

5. $$\begin{array}{r} 2.1 \\ 23\overline{)48.3} \\ \underline{46} \\ 23 \\ \underline{23} \end{array}$$

6. $$\begin{array}{r} .34 \\ 11\overline{)3.74} \\ \underline{33} \\ 44 \\ \underline{44} \end{array}$$

7. $$\begin{array}{r} .25 \\ 52\overline{)13.00} \\ \underline{104} \\ 260 \\ \underline{260} \end{array}$$

8. $$\begin{array}{r} 1.6 \\ 5\overline{)8.0} \\ \underline{5} \\ 30 \\ \underline{30} \end{array}$$

Copy, divide, and check. Remember to write your decimal point in the quotient before you divide.

1. $3\overline{)6.3}$ $4\overline{)5.32}$ $2\overline{)6.}$ $6\overline{).72}$

2. $9\overline{).45}$ $8\overline{)124.56}$ $12\overline{)43.08}$ $13\overline{)35.1}$

3. $25\overline{)8.}$ $4\overline{)1.}$ $21\overline{)6.3}$ $24\overline{)98.88}$

4. $17.68 \div 34 =$ $15.65 \div 44 =$ $\$32.50 \div 65 =$

5. $9.44 \div 59 =$ $3 \div 5 =$ $6.5 \div 50 =$

6. $1.60 \div 10 =$ $6.7 \div 10 =$ $9 \div 12 =$

7. $9.8 \div 35 =$ $4.8 \div 20 =$ $55. \div 125 =$

8. Divide 260.4 by 84
9. Divide 430.2 by 63
10. Divide 34.02 by 63
11. Divide 35 by 175
12. Divide 3.50 by 175
13. Divide .81 by 27
14. Divide 10 by 25
15. Divide 12 by 24

CARL'S GARDEN

1. Carl has a vegetable garden. One day he sold 75 ears of sweet corn. How many dozen did he sell?

2. A load of coal weighed 1600 pounds. What part of a ton is this? Express the answer as a decimal. Remember, 2000 lb. = 1 T.

3. Nell bought $8\frac{3}{4}$ yards of lace to sew around 7 handkerchiefs. If she makes the handkerchiefs all the same size, how many yards can she use for each? Write $8\frac{3}{4}$ as a decimal before you solve the problem.

4. Mrs. Mason bought 9 dozen peaches early in the summer for $2.88. What price did she pay for each dozen? Later in the summer she bought 12 dozen for $1.92. What price did she pay for each dozen then?

5. A farmer hauled a load of oats to market. The oats weighed 4048 pounds. The man at the market paid for the oats by the bushel, knowing that in his state 32 pounds of oats make a bushel. How many bushels were there in the load?

6. A time-table shows that Evansville, Indiana, is 288.4 miles from Chicago. It takes 8 hours to make the trip between the two cities on the train. How many miles does the train average by the hour?

7. Dick paid $28.80 for his board while he was at camp four weeks last summer. How much did his board average for each week?

Changing Decimals to Common Fractions

You remember that when you pictured hundredths by drawing a large square and dividing it into 100 small squares, you found that 5 hundredths can be written .05 or $\frac{5}{100}$. The two forms mean the same and have the same value.

1. Write the following hundredths in two ways:

sixteen hundredths	thirteen hundredths
forty-five hundredths	twenty-eight hundredths
fifty-six hundredths	eighty-two hundredths
seven hundredths	seventy-two hundredths
eighteen hundredths	thirty hundredths
twenty hundredths	ninety-eight hundredths

You remember that sometimes a decimal can be changed to a common fraction with a different name. For example, .50 can be written as $\frac{1}{2}$. .25 is the same as $\frac{1}{4}$. .75 is the same as $\frac{3}{4}$. When .75 is written as $\frac{3}{4}$, we say we have changed .75 to a fraction in its lowest terms. Look at the following exercise and see why this is true.

$$.75 = 75 \text{ hundredths}$$
$$75 \text{ hundredths} = \frac{75}{100}$$
$$\frac{75}{100} = \frac{3}{4}$$

2. Draw a rectangle 4 inches long and 1 inch wide. This rectangle shows the shape of a garden. Divide the rectangle into four equal parts by drawing lines from top to bottom. Color your rectangle in such a way as to show that .50 is the same as $\frac{1}{2}$. Show the class on your drawing that .25 is the same as $\frac{1}{4}$; that .75 is the same as $\frac{3}{4}$.

This shows you how a fraction that is written as a decimal may be changed to a common fraction.

Study these exercises and see how other hundredths written as decimals may be changed to common fractions in lowest terms.

1. Change .50 to a common fraction in lowest terms.

$.50 = 50$ hundredths
50 hundredths $= \frac{50}{100}$
$\frac{50}{100} = \frac{1}{2}$

2. Change .30 to a common fraction in lowest terms.

$.30 = 30$ hundredths
30 hundredths $= \frac{30}{100}$
$\frac{30}{100} = \frac{3}{10}$

3. Change 1.75 to a mixed number with the fraction in lowest terms.

$1.75 = 1$ and 75 hundredths
1 and 75 hundredths $= 1\frac{75}{100}$
$1\frac{75}{100} = 1\frac{3}{4}$

To change a decimal to a common fraction, write the decimal as a common fraction and reduce to lowest terms.

4. Change to fractions in lowest terms:

.6	.8	.40	.32	.16	.64

5. Change to mixed numbers with the fraction in lowest terms:

3.72	7.95	3.5	4.35	15.85	1.6	5.8

Copy the following decimals. Change to common fractions or to mixed numbers in lowest terms.

6.	.4	1.9	.48	.76	.65	3.70	9.8	2.1
7.	.02	.70	.15	.05	.18	.55	4.7	2.09
8.	.35	12.2	.08	11.25	3.40	1.16	.96	.55

Add and check:

1. $.28+3.7+.08+19.1+10.1=$
2. $7+9.8+11.1+.07+3.3=$
3. $1.3+.09+124.5+.17=$
4. $.1+.01+1+1.01+1.1=$
5. $3+.3+10+2.6+.81+5.3=$
6. $89.7+103+20.06+.04+.9=$

Subtract and check:

7. $13.01-6.5=$	$.78-.05=$	$7.9-3.28=$
8. $8-.2=$	$3-.63=$	$2.6-1.9=$
9. $9.36-9.18=$	$15.06-12=$	$120-.01=$

Multiply and check:

10. $.3\times 64=$	$1.8\times 12.1=$	$10\times 3.11=$
11. $.5\times 8.5=$	$100\times 1.7=$	$26\times .33=$
12. $10\times 6.7=$	$100\times .04=$	$1.5\times 27=$
13. $10\times .08=$	$.9\times .7=$	$100\times 4.53=$

Divide and check:

14. $13.3\div 19=$	$27.3\div 13=$	$61.32\div 21=$
15. $54.7\div 10=$	$15.4\div 55=$	$7.6\div 5=$
16. $4\div 32=$	$.8\div 10=$	$43\div 100=$
17. $9\div 18=$	$\frac{1}{4}\div 5$ (Write $\frac{1}{4}$ as a decimal)	
18. $.65\div 13=$	$\frac{3}{4}\div 15$ (Write $\frac{3}{4}$ as a decimal)	

Follow directions, and check each answer:

19. Add: \$17.25, \$11, \$21, \$.80, \$2.00
20. Add: .01, 2.3, 16, .06, 30.2
21. Multiply 15.09 by 56
22. Multiply 83 by .04
23. Multiply 416 by .03
24. Divide 24.64 by 44

FINDING OUR WEAK SPOTS

1. Multiply and check:

$\begin{array}{r} .2 \\ \underline{3} \end{array}$ $\begin{array}{r} .02 \\ \underline{4} \end{array}$ $\begin{array}{r} .4 \\ \underline{3} \end{array}$ $\begin{array}{r} .08 \\ \underline{2} \end{array}$ $\begin{array}{r} 4.5 \\ \underline{6.5} \end{array}$ $\begin{array}{r} .05 \\ \underline{8} \end{array}$

$\begin{array}{r} 25 \\ \underline{.5} \end{array}$ $\begin{array}{r} 35 \\ \underline{.4} \end{array}$ $\begin{array}{r} 8.4 \\ \underline{3.5} \end{array}$ $\begin{array}{r} 3.5 \\ \underline{2} \end{array}$ $\begin{array}{r} 4.50 \\ \underline{9} \end{array}$ $\begin{array}{r} 25 \\ \underline{1.5} \end{array}$

$10 \times .8 = ?$ $10 \times .65 = ?$ $100 \times 2.5 = ?$

2. Divide and check:

$2\overline{)8.2}$ $3\overline{)8.1}$ $15\overline{)11.7}$ $3\overline{).9}$ $4\overline{).2}$ $6\overline{).36}$

Remedial Exercises

CURING OUR WEAK SPOTS

1. Multiply and check:

$\begin{array}{r} .3 \\ \underline{3} \end{array}$ $\begin{array}{r} .04 \\ \underline{2} \end{array}$ $\begin{array}{r} .5 \\ \underline{2} \end{array}$ $\begin{array}{r} .09 \\ \underline{3} \end{array}$ $\begin{array}{r} .4 \\ \underline{5} \end{array}$ $\begin{array}{r} .04 \\ \underline{5} \end{array}$

$\begin{array}{r} 64 \\ \underline{.7} \end{array}$ $\begin{array}{r} 55 \\ \underline{.8} \end{array}$ $\begin{array}{r} 9.4 \\ \underline{4} \end{array}$ $\begin{array}{r} 4.2 \\ \underline{5} \end{array}$ $\begin{array}{r} 81 \\ \underline{5.5} \end{array}$ $\begin{array}{r} 36 \\ \underline{1.2} \end{array}$

$\begin{array}{r} .2 \\ \underline{.4} \end{array}$ $\begin{array}{r} .6 \\ \underline{.7} \end{array}$ $\begin{array}{r} 6.5 \\ \underline{4.6} \end{array}$ $\begin{array}{r} 8.5 \\ \underline{2.5} \end{array}$ $\begin{array}{r} 6.04 \\ \underline{5} \end{array}$ $\begin{array}{r} 2.50 \\ \underline{8} \end{array}$

$10 \times .6 = ?$ $10 \times .95 = ?$ $100 \times 3.6 = ?$

2. Divide and check:

$2\overline{)6.8}$ $4\overline{)2}$ $15\overline{)90.6}$ $2\overline{).8}$ $5\overline{).4}$ $7\overline{).49}$

WINNERS' PAGE
For the pupils who made no mistakes on page 275.

Remember the three questions that help you to know whether to add, subtract, multiply, or divide.

1. Grace bought 3 goldfish for $.35, a glass bowl for $.50, some assorted shells for $.15, and a box of fish food for $.17. What did she pay for all?

2. Ross needs 4 rods of fencing to make a new rabbit pen. The fencing costs $.03 a foot. How much will he have to pay for the fencing? A rod is $16\frac{1}{2}$ feet.

3. Ross ordered a dozen feed cups for his rabbits. He paid $1.80 for them, and $.60 more for postage. What was the total cost?

4. Howard's score on a reading test was 11.2. Jean's score was 9.6. How many points higher was Howard's score than Jean's? Charles found that his score was just halfway between Howard's and Jean's. What score did Charles make?

5. The average rainfall in a year in Atlanta, Georgia is 48.3 inches. In Salt Lake City, Utah it is $\frac{1}{3}$ as much. What is the average number of inches of rainfall in a year in Salt Lake City?

6. Eight boys going to the circus paid 25¢ each for their tickets to the main tent and 10¢ each for their tickets to one of the side shows. How much did the eight boys pay for all these tickets?

WINNERS' PAGE
For the pupils who made no mistakes on page 275.

1. Ellen's sister takes typewriting at high school. She has a speed of 75 words a minute. What is her speed by the second?

2. Mr. Ward's corn crop this year was 4875 bushels. Last year his crop was .80 as large. How many bushels did he have in last year's crop?

3. Mrs. Mills paid $3.41 for gas used in January. What was the average cost of the gas a day?

4. The children at Everett school want to buy a new radio for $125. They are giving a play. They have 200 tickets to sell at $.25 each, and 300 tickets at $.35 each. If they sell all the tickets, will they have enough money to buy the radio?

5. When Dan's father stopped at a filling station for gasoline this morning, he saw a sign which read, GASOLINE, 14.6¢. He bought 10 gallons of gasoline. What did the gasoline cost?

6. Adams County will build 3 paved strips of road. One is 20.5 miles long, another is 11.75 miles, and the third is .25 mile long where the old pavement was washed out in a valley. How many miles of paving are in the 3 pieces?

LENGTH, WIDTH, HEIGHT

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$5\frac{1}{2}$ yards or $16\frac{1}{2}$ feet	= 1 rod (rd.)
320 rods or 5280 feet	= 1 mile (mi.)

AREA

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)
640 acres	= 1 square mile (sq. mi.)

LIQUIDS

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

DRY MEASURE

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

WEIGHT

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 hundredweight (cwt.)
2000 pounds	= 1 ton (T.)

TIME

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
12 months (mo.)	= 1 year (yr.)
365 days	= 1 year
366 days	= 1 leap year

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